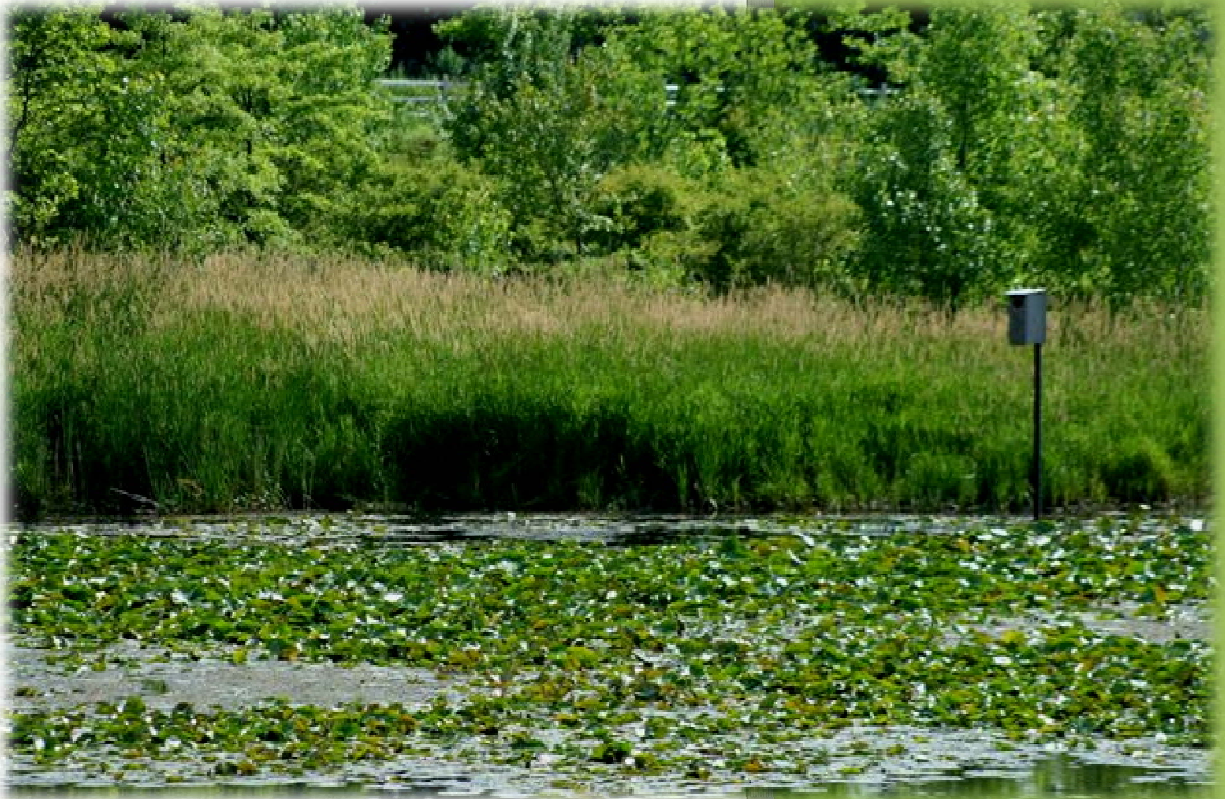# Greening Mid-Michigan Toolkit

SCHOOL OF
PLANNING, DESIGN & CONSTRUCTION

**Michigan State University:
Urban & Regional Planning Practicum
Spring 2010**
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Green Infrastructure
for the Tri-County Area

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EXECUTIVE SUMMARY

Urban and Regional Planning Practicum students at Michigan State University have compiled this report at the request of the Tri-County Regional Planning Commission (TCRPC) to assist in the implementation of a regional green infrastructure online toolkit for the Clinton, Eaton, & Ingham Counties. The current initiative was formed in 2007 by the TCRPC and it's partners and is referred to as the Greening Mid-Michigan Project (GMMP). Additional partners include: The Clinton County Parks & Greenspace Commission, Clinton County Agricultural Preservation Board, Clinton County Conservation District, Eaton County Parks, Eaton County Conservation District, Ingham County Parks, Ingham County Agricultural Preservation Board, The Greater Lansing Regional Committee for Stormwater Management, and The Michigan Trails & Greenways Alliance.

As of April 2010, phase I and phase II of the project are complete and include an inventory of significant natural features and an assessment of potential conservation areas, respectively. Phase III of GMMP includes outreach and advocacy to community members and organizations and the implementation of this online toolkit. This document has been the result of extensive data collection and interpretation to provide local agencies a better understanding of what a green infrastructure network consists of and specific tools to guide in the development and implementation of such. One major focus of this document consists of providing local agencies with the necessary tools and resources to implement a green infrastructure vision.

Green Infrastructure is an interconnected network of green space and other environmental assets that conserves the functions of the natural ecosystem and provides associated benefits to people. (TCRCP, 2008). The anatomy of green infrastructure relies on a system of hubs, sites, and links. Hubs may be considered as key attractions to an area such as parks, downtowns, neighborhoods and other area attractions (see Figure 4). Sites consist of other area attractions such as schools, shopping centers, entertainment areas, green buildings, etc. Links are corridors of trails and open spaces that link to hubs, while remaining as close as possible to sites of interest, and allow animal movement, seed, and pollen transfer between hubs. The guiding principles of green infrastructure are to preserve and/or link natural areas to benefit biodiversity and counter habitat fragmentation, and protect and/or link parks and other green spaces.

The resources examined in this document have been organized in similar categories (hubs, sites, links, management, & public input) and include the following:

Hub Tools:

- Parks and Recreation
- Urban Forestry

FIGURE 1: ANATOMY OF GREEN INFRASTRUCTURE

Site Tools:

- Low Impact Development (LID)
- Green Building
- Historic Preservation
- Brownfield Reclamation
- Infill Development
- Urban Agriculture / Community Gardening
- Rural Agribusiness

Link Tools:

- Trails and Non-Motorized Pathways
- Wildlife Corridors

Management Tools:

- Purchase of Development Rights (PDR)
- Transfer of Development Rights (TDR)
- Watershed Planning
- Conservation Easements
- Health Impact Assessment (HIA)

Public Input Tools:

- Voluntary Stewardship

Each green infrastructure tool provided is divided into 6 major categories:

1. Background: An explanation of the tool and its relation to green infrastructure practices
2. Methods of Implementation: How the tool can be implemented in communities by different levels of government and agencies throughout the Tri-County region
3. Funding: A wide array of funding options communities may choose from including state and federal grant programs and local improvement funds
4. Case Studies: Detailed examples of past and current projects that have coordinated green infrastructure projects in local, state, and national communities
5. Ordinance Language / Regulatory Considerations: Samples of legal documents and other community resources that currently function and conform within local, state, and national governments
6. Discussion: Analysis of each green infrastructure tool including benefits and impediments

Users of this document should use this as a resource to guide them to a potential action, as the information may change over time.

PRACTICUM STRUCTURE

Michigan State University requires Urban and Regional Planning Students to participate in a capstone project to help students gain practical "hands on" experience in the planning field. The objective of the project is to have students work collaboratively on a project and develop a product that satisfies the needs of the client(s). The projects involve a number of skills including: meeting with clients, developing a scope of services, managing team work, and developing skills in creative problem solving, public speaking, designing and using graphics, and report writing.

The client for this practicum project is Tri-County Regional Planning Commission, and their need is for the implementation of their Greening Mid-Michigan Project within the Tri-County region. The liaison between the Michigan State University Practicum group and Tri-County Regional Planning Commission was Harmony Gmazel, AICP, Land Use Planner.

Acknowledgements:

The MSU planning practicum team would like to thank the following individuals for their continuous amount of support and guidance that lead to the completion of this report:

- Dr. Rex LaMore, Urban and Regional Planning Practicum Instructor, MSU
- Dr. Zenia Kotval, Urban and Regional Planning Practicum Instructor, MSU
- Ms. Harmony Gmazel, AICP, Land Use Planner, Tri-County Regional Planning Commission
- Ms. Beata Ndovie, Professional Aid, Urban Planning Partnerships/Urban Collaborators, MSU
- Nancy Krupiarz, Executive Director, Michigan Trails and Greenways Alliance

The MSU students that completed this report during the Spring Semester of 2010 are as follows:

- Keith Derwich
- Andrew Haglund
- Steven Hill
- Katherine Kline
- Trinh Nguyen
- Tory Niewiadomski

CLIENT INFORMATION

The tri-county region consists of 3 counties, Ingham, Eaton, and Clinton, which includes 78 separate units of government including 27 cities and villages, 48 townships. It is located in the central area of the lower peninsula of Michigan, surrounding the state's capital of Lansing; see Figure 1 and Figure 2 below. The total population of the three counties totals approximately 450,000 with Ingham County holding the majority of the population at 279,000, as of the year 2000.

Currently, of the 78 units of government, approximately 50 have their own zoning and planning authority for guiding the growth and development of their respective areas. The region contains many special districts such as drainage districts, school districts, road commissions, soil conservation districts, transportation authorities, and sewer and water authorities. The Tri-County Planning Commission exists as the mechanism to coordinate the plans between each unit of government and to guide the growth of the area in one common direction.

(TCRCP, 2010)
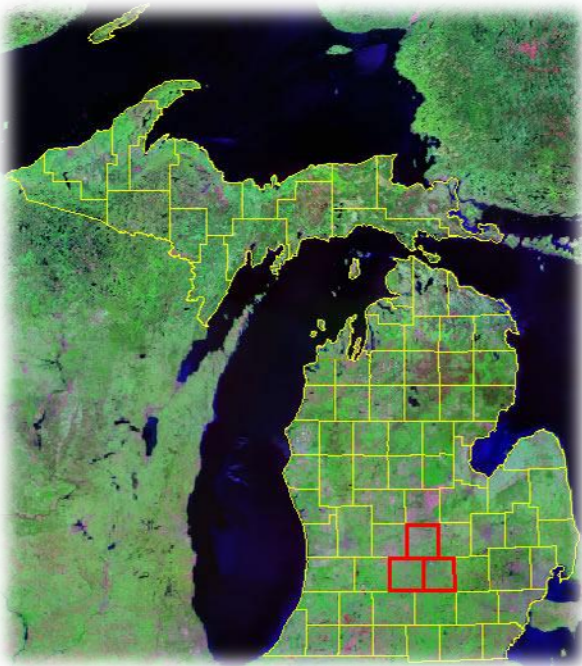
FIGURE 3: TRI-COUNTY REGION ENLARGEMENT

FIGURE 2: MAP OF MICHIGAN, TRI-COUNTY REGION HIGHLIGHTED IN RED

INTRODUCTION

Project Description:

The Tri-County Regional Planning Commission is the lead partner on the Greening Mid-Michigan Project. The commission's staff and the Michigan State University Urban and Regional Planning practicum group have partnered to develop an online toolkit to aid in the implementation of a Green Infrastructure vision for cities, villages, townships, county planning, parks, and public works departments within the tri-county region. The role of the practicum group was to conduct the necessary research and data collection for the toolkit and compile the information into an easily accessible document.

Green Infrastructure:

Green Infrastructure is an interconnected network of green space and other environmental assets that conserves the functions of the natural ecosystem and provides associated benefits to people. (TCRCP, 2008). The anatomy of green infrastructure relies on a system of hubs, sites, and links. Hubs may be considered as key attractions to an area such as parks, downtowns, neighborhoods and other area attractions (see Figure 4). Sites consist of other area attractions such as schools, shopping centers, entertainment areas, green buildings, etc. Links are corridors of trails and open spaces that link to hubs,
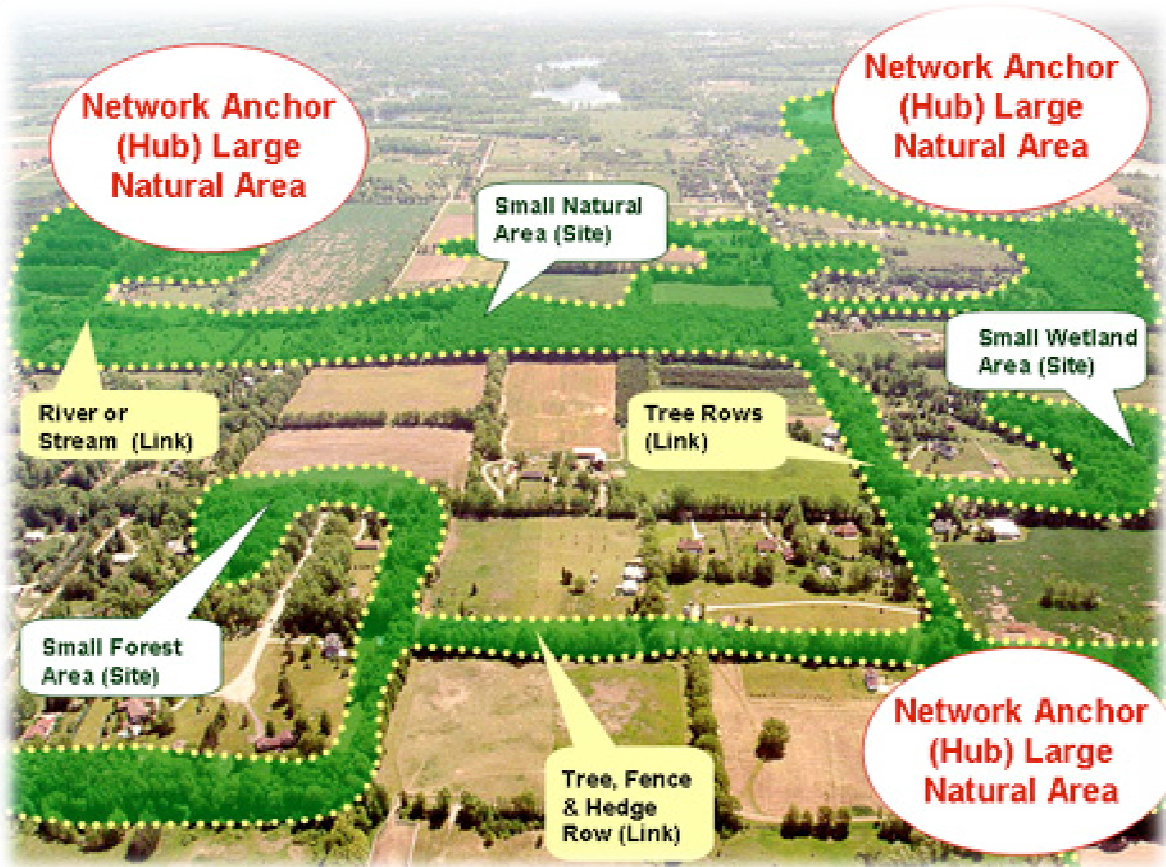
FIGURE 4: ANATOMY OF GREEN INFRASTRUCTURE

while remaining as close as possible to sites of interest, and allow animal movement, seed, and pollen transfer between hubs. The guiding principles of green infrastructure are to preserve and/or link natural areas to benefit biodiversity and counter habitat fragmentation, and protect and/or link parks and other green spaces.

Tri-County Regional Planning Commission & its partners have planned for three phases of the Greening Mid-Michigan Vision, two of which are already completed. The Greening Mid-Michigan Vision is currently under development. This "vision" for a green infrastructure network is the result of a public visioning workshop that attracted approximately 150 people from throughout the region. An interconnected web of existing and proposed green infrastructure elements were identified at the workshop. In order to implement this network, a toolkit is needed.

The first phase identified natural features within the tri-county area which was completed in late 2008. The natural feature inventory created a Potential Conservation Area Plan showing areas of interest throughout the three counties. The second phase included the prioritization of high quality natural areas for each county. The data generated GIS layers to allow for mapping high priority areas for public use. The third phase, currently in progress, includes the mapping of a green infrastructure vision and intense public engagement. Phase three also includes Michigan State University's Urban and Regional Planning practicum group in collaboration with Tri-County Regional Planning Commission to help achieve the implementation of the green infrastructure plan by providing tools for local planning officials and staff in the form of a toolkit.

Below is a link to a summary of the Greening Mid-Michigan Vision and its phases:
http://www.eatoncounty.org/Assets/Eaton+Conservation+District/GMMP+Summary+sheet.pdf

HOW TO USE THE TOOLKIT

This toolkit is designed for use by planners, developers, designers, government officials, and the public within the greater tri-county region. The toolkit provides information on actions that may be taken to transition to a greener community. Each tool description in the handbook provides information regarding the background, methods of implementation, funding, case studies, resources, sample ordinance language and/or regulatory considerations, & a tool discussion. This material should provide the user with enough information to undertake green infrastructure development within the region. These tools are intended to be used as resources to guide the practitioner to additional information found across the state, nation, and world.

Each tool was carefully selected according to its function in green infrastructure and whether or not it could pertain to the local area. The toolkit has been organized in such a way to relate the user to the green infrastructure anatomy (hubs, sites, & links). Two additional sections, titled "management" and "public input", were added for additional guidance for the implementation of green infrastructure.

Users will be able to select the most applicable part of green infrastructure of interest and view tools for implementing the vision. Each tool contains a brief summary of the tool, how to implement the tool, what funding options are available, specific case studies, and information regarding sample ordinance language and/or regulatory considerations. Under the **Resources** section, the user will be directed to additional information to outside sources.

Disclaimer Statement:
This toolkit uses a variety of sources and provides links to many websites, PDF files, and reports all accessed on or before May 2010. The Tri-County Regional Planning Commission and Michigan State University's Practicum Group are not responsible for the changing content in these sources, or the possibility of the sources being no longer in existence. The toolkit intends to provide information at the users fingertips, but not to restrain them from finding or using additional information that may be used elsewhere. In using the toolkit, the user understands the information provided through the various links may change over time and may not be in accordance with the Tri-County Regional Planning Commission and Michigan State University's Practicum Collaborator's ideas expressed in this toolkit.

CONTINUOUS IMPROVEMENT PLAN

This toolkit contains a great deal of information and additional outside resources to direct users to help implement the Greening Mid-Michigan vision. This toolkit may become out of date quickly if the information and links are not kept up-to-date. Our recommendation to the Tri-County Regional Planning Commission and the associated users of this toolkit for maintaining up-to-date resources is as follows:

- Once a year check through all links to verify they are working and that the material listed on the website correlates with the Greening Mid-Michigan movement.
- Develop a document or a web link that users can send to the Tri-County Regional Planning Commission describing an issue they see with the information provided.
- Develop a document or a web link that users can suggest added material for the website or the overall document.
- The Tri-County Regional Planning Commission and users of this toolkit should be aware of any new tools that could be implemented into the toolkit.
- The Tri-County Regional Planning Commission and users of this toolkit should setup social networking for the region where "green" local projects or case studies can be uploaded and discussed or used as a reference for future projects.

TOOL MATRIX

The tool matrix shown on the next page is designed to help the user quickly distinguish which tool(s) is (are) most applicable to specific situations. Along the left side of the matrix, each row has been given a tool and is formatted in the same order and category as this toolkit; tool categories are hubs, sites, links, management, and public input. Although each tool is shown in only one category, some may fit into more than one category.

Along the top of the matrix, each column has been given various situations the user may encounter, or facts regarding the tools to help the user determine which tools are more applicable. The columns have been respectively grouped into the following headings and are defined as follows:

Setting

> The setting category refers to where the tool of interest can be used. Urban refers to a location within the center of a highly developed area such as a city; suburban refers to a location outside of the center of a highly developed area; and rural refers to a location outside or away from any densely developed areas.

Planning

> The planning category refers to the various stages of the planning process that the tool of interest could be implemented; the subcategories noted are the master plan, zoning, & public participation.

Incentives

> The incentives category refers to various funding options (ie: tax credits, grants, loans, etc.) for the tool of interest. The incentives category has been broken into four subcategories as follows: federal, state, local, & private/non-profit.

Implementation Cost

> The implementation cost category is an estimate of how much the tool will cost to implement including planning, designing, construction, etc. The category has been broken into high, medium, and low subcategories to help estimate these costs.

Maintenance

> The maintenance category is an estimate of how much the tool will cost maintain after it has been implemented. The category has been broken into high, medium, and low subcategories to help estimate these costs.

The "X" listed under the various categories implies that the tool can be used in the heading criteria listed at the top. Please use this matrix as a guide to stimulate your thinking rather than as a list of fixed examples.

	TOOLS	SETTING			PLANNING			INCENTIVES				IMPLEMENTATION COST			MAINTENANCE		
		RURAL	SUBURBAN	URBAN	MASTER PLAN	ZONING	PUBLIC PARTICIPATION	FEDERAL	STATE	LOCAL	PRIVATE / NON-PROFIT	HIGH	MEDIUM	LOW	HIGH	MEDIUM	LOW
HUBS	PARKS & RECREATION	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	URBAN FORESTRY			X	X	X	X	X	X	X	X	X	X	X	X	X	X
SITES	LOW IMPACT DEVELOPMENT (LID)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	GREEN BUILDING	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
	HISTORIC DISTRICTS	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
LINKS	TRAILS AND NON-MOTORIZED PATHWAYS	X	X	X	X	X	X	X	X	X	X		X	X		X	X
	WILDLIFE CORRIDORS	X	X		X		X	X	X	X	X		X	X			X
MANAGEMENT	PURCHASE OF DEVELOPMENT RIGHTS (PDR)	X	X		X	X			X	X				X			X
	TRANSFER OF DEVELOPMENT RIGHTS (TDR)	X	X	X	X	X			X	X	X			X			X
	WATERSHED PLANNING	X	X	X	X		X	X	X	X	X		X	X		X	X
	CONSERVATION EASEMENTS	X	X	X	X	X	X		X	X	X	X	X	X			X
	BROWNFIELD RECLAMATION	X	X	X	X		X	X	X	X	X	X	X	X			X
	INFILL DEVELOPMENT		X	X	X	X	X		X	X				X			X
	URBAN AGRICULTURE / COMMUNITY GARDENING		X	X	X		X		X	X	X		X	X		X	X
	RURAL AGRIBUSINESS	X			X		X	X	X	X	X			X			X
	HEALTH IMPACT ASSESSMENT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PUBLIC INPUT	VOLUNTARY STEWARDSHIP	X	X	X			X	X	X	X	X			X			X

ZONING REGULATIONS

Many of the tools discussed in this document can be implemented through the use of zoning regulations. Enabling the zoning ordinance to be more restrictive in some areas and less restrictive in others could help guide local developments towards the Greening Mid-Michigan vision. There are several areas within the zoning ordinance where these adjustments should be made, they are as follows:

Site Plan Review Process

> The site plan review process typically covers the requirements a developer must meet to receive site plan approval. This section guides the developer to refer to the zoning district regulations of the site under consideration. For green infrastructure, within each of the zoning district sections, various requirements are given to guide the development site. Items such as setbacks and densities can be used to encourage the Greening Mid-Michigan vision.

> Building and parking setback requirements typically enforce standard setbacks for specific land uses. However, natural features of the land are not always considered and additional setback requirements could be enforced to provide more green space. Setbacks along rivers, streams, creeks, lakes, and natural areas could be listed under each land use regulation section requiring buffer zones.

> Required densities are found in zoning ordinances enforcing minimum and maximum densities. Similar to setbacks, they are typically setup in relation to surrounding properties to encourage separation of lower density from higher density land uses in the master plan. However, increasing or decreasing densities can be used as incentives for implementing low impact development. This can also be an important feature for Planned Unit Development (PUD) districts.

Special Use Permits

> Similar to the site plan review process, the special use permit process regulates uses that are not permitted by right, based on the zoning ordinance. The Greening Mid-Michigan Vision can be implemented through special use permits if the reviewing body incorporates aspects of green infrastructure into it's conditions. When a developer approaches the municipality for a special use permit, conditions of approval could include green infrastructure elements. Allowing a developer increased setbacks and increased densities, etc. could be provided as incentives if a developer, for example, implements low impact development methods on a site.

Landscaping Sections

> The landscaping requirement section of a zoning ordinance typically refers to the type, spacing, and the number of trees & shrubs needed along property lines, parking areas, land use buffers, etc. Ordinances often lack specifics in the area of green infrastructure and low impact

development. The Greening Mid-Michigan Vision can be encouraged through the landscape section in many ways:

- Low impact development techniques (pg. 47), could be added to landscaping requirements.
- Landscape buffers can be added along lakes, streams, & rivers, similar to buffers required between land uses.
- Use of Indigenous species.
- Buffer averaging can be implemented to allow flexibility for development. (See Figure 4 and Figure 5 below).
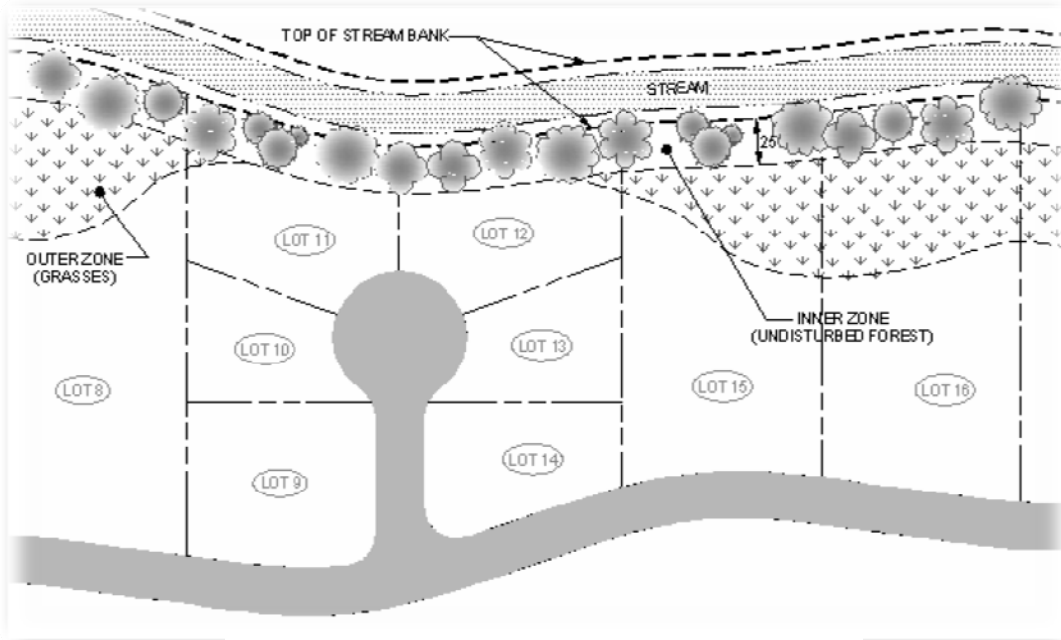
FIGURE 6: BUFFER AVERAGING IN A RESIDENTIAL DEVELOPMENT
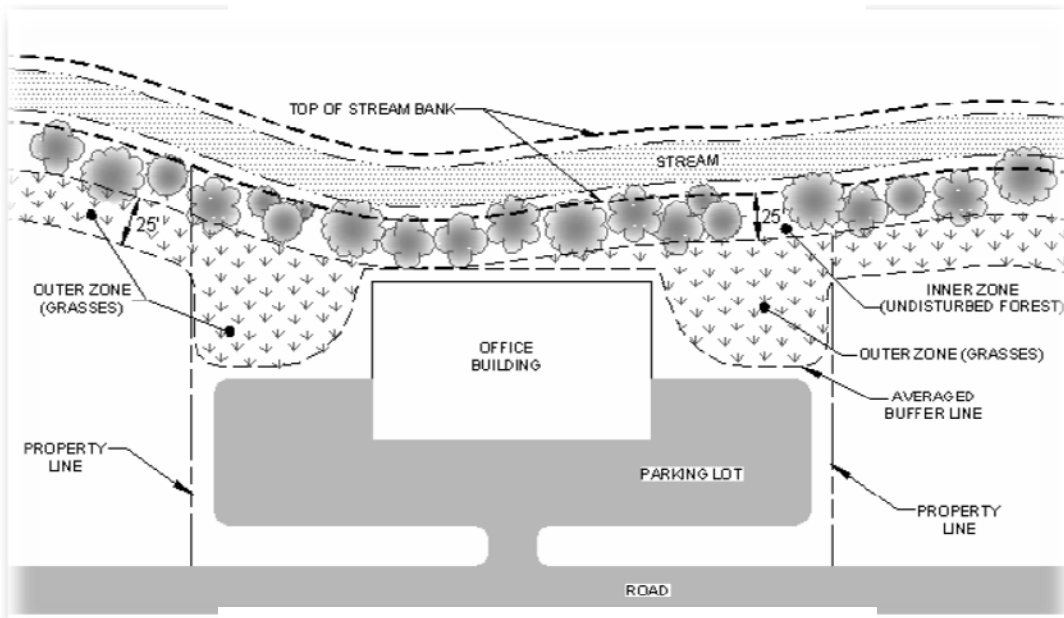
FIGURE 5: BUFFER AVERAGING IN A NON-RESIDENTIAL DEVELOPMENT

GREENING MID-MICHIGAN TOOLKIT: HUB TOOLS
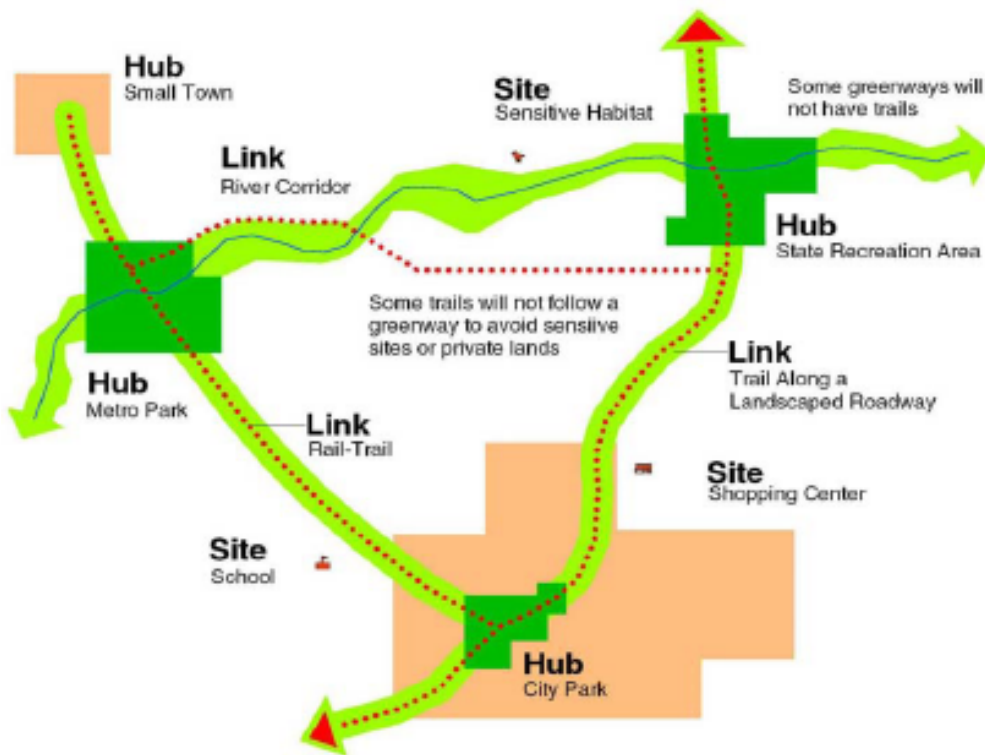
Hubs are considered as natural main attractions for an area and can consist of: Parks, Downtowns, Neighborhoods, Riverfronts, University Campuses, etc.

PARKS AND RECREATION

BACKGROUND

Parks and Recreation areas are hubs and sites that can be connected by links in a green infrastructure network. They are represented in many shapes, sizes, and uses that contribute to the preservation of land, protection of native plants and biodiversity, and offer members of the public a variety of engaging open space. The category itself ranges from a small piece of playground equipment with the ability to entertain a child for hours to a breathtaking, monumentally scaled, natural feature protected from development pressures. Over the past century many individuals, organizations, and social movements have emphasized the importance of protecting our natural land and at the same time, maintaining the interaction between humans and nature.

Traditionally, site specific conservation took place where individual plots of land were reserved without attention to surrounding ecological environments (Benedict M. A., 2006). The importance of ecological processes and the connectivity between the natural environments precede this. Researchers discovered that protecting natural systems include the preservation of wildlife connections that encompasses individual

> *"As the decades have swept past, parks have evolved from merely preserving land to become what we value most: a place where you can connect with our spectacular natural home. New parks are our gift to the next generation"*
> (Oregon State Parks, 2010-2011)

habitats for species and the overall ecological processes that take place for sustainability. In short, it is important to conserve lands through parks but also to connect them with other natural and environmental features such as wildlife corridors, trails, and water. Parks and recreation is a major factor in the role of community health and well being. Strong communities offer their members a wide array of parks and recreation opportunities that promote healthiness, social connections, and economic activity while reserving valuable environmentally sensitive areas. Bulleted below are reasonable characteristics of a successful parks and recreation area:

- Range of activities provided to all ages,
- Easy Access and Connectivity within,
- Safe, Clean, and Attractive,
- Areas for sitting and people watching,
- Sociability: A place to meet and interact with other community members, and
- Adapting Change: experiment and evaluate park uses to better fit changing times (Kent, 1998).

FIGURE 7: EATON RAPIDS, MI (LEFT)

FIGURE 8: MOONLIGHT FILM FEST, EAST LANSING, MI (ABOVE)

Appendix J contains maps of the Tri-County region displaying existing park and recreation areas as inventoried by the TCRPC. It is important to plan for parks and recreation areas within a community, but jurisdictions must keep in mind the surrounding areas and how the location and proximity of additional parks and recreation areas can benefit by linking other features throughout the region.

Parks and Recreation opportunities are offered at each level of government including; federal, state, and local. Non-profit, community organizations, and private companies are also involved with the development and advocacy of parks and recreation. Currently there are three game areas, one state park, and numerous county, municipal and private parks throughout the tri-county region. Each jurisdiction and county has the responsibility to update and maintain a five year parks and recreation master plan for the benefit of acquiring Michigan Natural Resource Trust Fund money or Land and Water Trust Fund money for park acquisition and development. The "Sample Ordinance Language / Regulatory Consideration" section provides an overview of current county and local government master plans and possible practices that assist with the development of parks and recreation opportunities.

METHODS OF IMPLEMENTATION

Successful projects occur when local government, officials, and staff work with community members; to find suitable areas, develop and implement a plan, and have the ability to maintain, parks and recreation. They can be developed in different settings throughout the Tri-County area including urban and rural places.

Potential Conservation Areas

    The Tri-County Regional Planning Commission and its partners acquired a potential conservation area report which identifies the most significant natural areas in Clinton, Eaton, and Ingham counties. The report was prepared by Michigan Natural Features Inventory. It offers detailed maps (using Geographic Information Systems, GIS) and inventories of land cover including;

- Land Use History and Change from 1800 to 2000,
- Rare Plant Diversity,
- Rare Terrestrial Animals,
- Aquatic Biodiversity Assessment and
- Rare Aquatic Animals, among many others.

    This detailed report is an excellent resource when developing and implementing parks and recreation areas. It is recommended that each jurisdiction and county should have this report on file and reference it for all planning processes.

    An online version is located at www.greenmidmichigan.org under the "Maps" tab.

Urban Parks and Recreation

This section will provide a better understanding of where an urban park and recreation area may be located to serve as a hub, and how different elements support the use and physical form of such to accommodate the desires of communities and enrichment of economic opportunities.

Located in densely populated urban areas, urban parks are generally placed near neighborhoods and employment centers and can be planned in conjunction with mixed use developments. Areas in this region that are generally appropriate for urban parks include;

"If urban parks can evolve from their current, primarily recreational role, into a new role as a catalyst for community development and enhancement, parks will be an essential component in transforming and enriching our cities."

(Kent, 1998)

- Urban cores,
- Suburban centers,
- Transit station areas,
- Community business centers,
- Town centers and
- Mixed-use activity centers.

Context and Location

The placement of urban parks is generally designed to engage those public and private uses located nearby. Urban parks, as hubs, are also placed near highly traveled pedestrian routes. Parks function as public spaces that enhance human interaction and connect residents to natural settings in an urban context. Other elements to support functional urban parks are listed below (Fairfax County, 2008);

- Pedestrian-Oriented
- Provide visual enhancement
- Sense of identity
- Opportunities for social interaction
- Enjoyment of outdoor open space
- Small-scale recreation: performing and visual arts
- Provide leisure opportunities
- Separate building clusters
- Create a rhythm for any development pattern
- Central civic space for community building activities

Access

Access to urban parks is a key aspect, regardless of ownership. "Accessibility from the public realm, such as streets and sidewalks, extends the public realm into urban park spaces. Access is generally by pedestrian, bicycle or other non-motorized means and universal accessibility should be ensured. Urban parks should be provided in locations that are near transit facilities, trail systems and high pedestrian traffic areas. Connectivity among urban public spaces is also desirable" (Fairfax County, 2008). Including automobile parking in close proximity to parks encourages commuters to extend their time within the urban area and will attract a higher volume of park and recreation users.

Amenities

The following amenities within urban parks are also desirable;

- Signage,
- Lighting,
- Bike racks,
- Landscaping,
- Playgrounds,
- Transit-oriented amenities,
- Water features,
- Security features, and
- possibly internet "hot zones"
- American with Disabilities Act (ADA) Facilities

FIGURE 9: AVERILL PARK PLAYGROUND, LANSING, MI (LEFT)

FIGURE 10: VALLEY COURT PARK, EAST LANSING, MI (BELOW)

Within larger urban parks, amenities may include recreational facilities that take into account the needs of all users such as;

- Athletic courts,
- Open lawns,
- Performance theater and
- Fitness stations

FIGURE 11: PERFORMANCE SHELL, ST. JOHN'S, MI

The amenities allow programmed activities and other events to occur onsite. Other amenities include; public gardens, restrooms, parking, food service areas, amphitheatres, and picnic shelters

Form and Visuals

"Well-conceived and executed design is critical to the viability of urban parks. Generally, urban parks consist of one or more intimate spaces or rooms, smaller than typical suburban parks and should complement surrounding uses, context, design, natural features and architecture. These

spaces should be constructed of high quality hardscape and landscape materials that are sustainable, durable and environmentally sound. Urban parks may range from a single "room" to multiple "rooms" in design. Design should be consistent with design guidelines adopted for an area and should support transient, short visits and consider its appeal to a range of users." (Fairfax County, 2008, p. 4).

Size and Service Area

"In urban areas, park size is typically less than five acres and often under ½ acres. Service area is generally within a 5-10 minute walking distance (or ¼ - ½ mile) from nearby   offices,   retail and residences. New developments should provide 1.5 acres per 1,000 residents and 1.0 acre per 10,000 employees. Within urban, mixed-use development areas, a full complement of urban park types is desirable to create robust park networks." (Fairfax County, 2008, p. 4).

Management

"Urban parks can be owned, managed, and/or administered by private land owners, community groups, public agencies and authorities or quasi-public agencies and authorities (such as business improvement districts) or through joint public and private sector agreements for public benefit" (Fairfax County, 2008). One example of urban park management is the Lansing Parks and Recreation Department.

Link: http://www.cityoflansingmi.com/parks/index.jsp

Rural Parks and Recreation

Some of the elements in urban parks and recreation can be applied to rural areas such as park amenities and management. The difference is context and location, access, form and visuals, and size and service area;

- Agriculture, forests, wetlands and other rural areas foster large amounts of space that may be targeted as a suitable park and recreation site,
- Their access is primarily limited by automobile transportation,
- The forms and visuals of rural parks are dependent on natural landscape compared to the hardscape elements of urban parks, and
- Typically rural parks are owned and managed by state, county, and private sector. For example, a non-profit organization e.g. Michigan Wildlife Conservation manages Bengel Wildlife Center in Bath Township.

Link: http://www.miwildlife.org/

FUNDING

Federal Funding

National Park Service Technical Assistance Programs
"The National Park Service (NPS) provides technical assistance to its partners -- State, tribal, and local governments, federal agencies, private organizations, and universities -- to promote the protection and preservation of cultural resources. This may take the form of advisory consultation, planning services, site visits, and co-sponsored conferences and workshops. The information and activities are generally available to a broad public as well."

A list of grants can be found at the following link. Contained in this document are short descriptions of each grant followed by a specific link for application information.
http://www.achp.gov/docs/BRAC/Historic_Preservation_Assistance_Programs-June_06.pdf

State Funding

Michigan Department of Natural Resources and Environment offers a wide array of grants for Parks and Recreation. To receive any funding from the MDNRE, a five year community recreation plan must be adopted by the regulatory body. To prepare such a document, the MDNRE offers "Guidelines for the Development of Community Park, Recreation, Open Space, and Greenways Plans."
http://www.michigan.gov/documents/IC1924_149265_7.pdf

A single document prepared by the MDNRE contains a listing of offered grants. The document itself is very well organized with each grant following the same format.
Link: http://www.michigan.gov/documents/2006_Grant_Programs_140487_7.pdf

Below are several examples from this document along with additional state funding opportunities (a direct link to their specific website is provided):
- Michigan State Parks Endowment Fund
  - http://www.michigan.gov/dnr/0,1607,7-153-10366_10871-44013--,00.html
- Land and Water Conservation Fund
  - http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-125326--,00.html
- Michigan Natural Resources Trust Fund (MNRTF)
  - http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-124961--,00.html
- Waterways Program Grants
  - http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-124962--,00.html
- Boating Infrastructure Grant Program

- o http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-178821--,00.html
- Michigan Habitat Improvement Fund Program Grants
  - o http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-125028--,00.html
- Cool Cities Grant
  - o http://www.michigan.gov/gov/0,1607,7-168-29544_29546_29555---,00.html

Local Funding

Capital Improvement

The following is from America Planning Association Economic Development Administration Online Toolbox: "The capital improvement program (CIP) — a five — to six-year schedule of capital improvement projects — is one of local government's most powerful tools for implementing a local comprehensive plan and supporting both commercial/industrial and residential growth. By carefully selecting and timing capital projects, the CIP process can ensure that a local government:

- Repairs and replaces existing infrastructure;
- Meets needs in mature, growing, and redeveloping areas;
- Coordinates activities or various government department; and
- Ultimately influences the pace and quality of development in a community.

The CIP document itself consists of project descriptions along with schedules and tables showing revenue sources and expenditures by year. Capital improvements include major nonrecurring expenditures for such projects as civic centers, libraries, museums, fire and police stations, parks, playgrounds, street construction or reconstruction, sewage and water treatment plants, water and sewer lines, and swimming pools. Costs associated with capital improvement projects include architectural and engineering fees, feasibility studies, land appraisal and acquisition, and construction." (APA, American Planning Association, 2008)

Private Funding

Private funding and grant programs can range from low to high amounts of moneys and resources. It is recommended that when applying for private funding, to obtain information about the program and/or agency that is providing the grant. It is also recommended to make the application more personal and specifically directed towards the agency compared to government funding and grant programs.

John Ball Zoo Society Wildlife Conservation Fund

1. To enhance or assist wild animal preservation, native and exotic, threatened and endangered, and their habitat management.
2. To enhance or improve captive animal management including environmental design. Note: Grants are not awarded for exhibit development or graphics for AZA accredited zoos or zoo in North America.
3. To assist in the development of education programming in concert with the above purposes.

Up to $2,500 rewarded for projects that fit the qualifications.
Deadline: April 1, 2010 (Grants are annual and submission dates may vary)
http://www.johnballzoosociety.org/conservation.php

Freshwater Future Grant Programs
This program is ideal for parks with rivers, lakes, and wetlands. The goal of this grant is to stimulate community initiatives "by providing financial assistance, communications and networking assistance and technical assistance to citizens and grassroots watershed groups throughout the Great Lakes basin." There are three different grants offered and further inquires can be found on their website.
http://www.freshwaterfuture.org/grants.html
The Friends of the Looking Glass organization received $350 for a river clean up in 2008.

Grants for Non-Profit Recreation
Michigan State University provides a compilation of grant descriptions and web links for various recreation grants for non-profit organizations. Some that are included are as follows;

- Access Fund: Purpose is to keep climbing areas open and maintained.
- Baseball Tomorrow Fund: Purpose "is to promote and enhance the growth of Baseball in the US" by provided funds to new and existing programs.
- Flaghouse: Purpose is to provide assistance in grant writing to schools that are interested in purchasing there equipment through various funding opportunities.

http://staff.lib.msu.edu/harris23/grants/2rec.htm

The Host Community Agreement is an example of a public and private partnership between a local government, Dewitt Charter Township, and a private company, Granger and Associates. The partnership is established so that both parties will mutually benefit. The National Council of Public-Private Partnerships provides more information on how to successfully implement this planning technique.
http://ncppp.org/howpart/index.shtml

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

County Level Parks and Recreation Master Plan

The county parks and recreation plan is a vital document to ensure effective communication and goals within local jurisdictions. The document provides a recent inventory of the community, collection of public input data, and future direction for parks and recreation. To ensure cooperation, communication, and direction it is necessary to review this document constantly. Each county in Tri-County offer their Parks and Recreation Master Plan online.

Clinton County Park, Recreation & Open Space Plan 2008-2012:
http://www.clinton-county.org/greenspace/parks/OpenSpacePlan2008-2012.pdf

Eaton County Parks and Recreation Master Plan 2009-2013:
http://www.eatoncounty.org/Assets/Parks/Five-Year+Parks+Master+Plan+(2009-2013).pdf

Ingham County Parks and Recreation Plan 2007-2011:
http://www.ingham.org/PK/MasterPlan2007Final.pdf

Township Level Parks and Recreation Master Plan

Delhi Township:
http://www.delhitownship.com/parks.htm

Delta Township:
http://www.deltami.gov/?page_id=575

Meridian Township:
www.meridian.mi.us

Watertown Township:
http://spdc.msu.edu/LinkClick.aspx?fileticket=JihX%2BEfAZSU%3D&tabid=249

Eaton Rapids Township:
http://www.partnershipsforchange.cc/eatonrapids/downloads/eaton_rapids_twp_parks_plan.pdf

City Level Parks and Recreation Master Plan

City of Dewitt:
http://www.dewittmi.org/documents/PR_5yrMasterPlan.pdf

City of Lansing:
http://www.lansingparks.info/index.php?option=com_wrapper&view=wrapper&Itemid=8

City of East Lansing:
http://www.cityofeastlansing.com/Home/Departments/ParksRecreationArts/CommunityParksRecreationPlan/

City of Eaton Rapids:
http://www.ci.eaton-rapids.mi.us/
(Available in 2010)

City of Mason:
http://www.mason.mi.us/recplanupdate.htm

City of St. John's (Community Development Plan, pages 86-88 contain Parks/Rec)
http://www.ci.saint-johns.mi.us/departments/community-development-details.shtml#commdevplan

Inter-local Agreement for Recreation

"The purpose of this Inter-local Agreement is to facilitate and support varied recreational opportunities principally for the residents of the City of Charlotte, the Township of Eaton, and the Township of Carmel. Resources allocated and/or generated through the establishment of this Agreement will be directed toward, but not limited to, the development and maintenance of facilities, fields, and spaces that enhance recreational and sport offerings."
http://www.carmeltownship.org/carmel_township_website_Novembe/Communications/recreation%20agreement.pdf

CASE STUDIES

Granger Meadows Park, Dewitt Charter Township, MI

Granger Meadows Park was created by a public-private partnership between Dewitt Township and Granger and Associates through a Host Community Agreement. The park contains year-round recreational opportunities and many organized activities and programs for all ages. Included in the park are walking, biking, and skating trails that connect each different recreation use. Recreation uses include:

- Disc Golf Course
- Sledding Hill with night time lights
- Playground
- Athletic Court/Fields
- Picnic and Sheltered Areas
- Public Restrooms
- Roller Rink
- Concessions

Granger, a trash and recycling company, donated 76 acres of land to the township and assisted in the construction of the park. The Host Community Agreement between Dewitt Charter Township and the company allowed them to add additional acreage to the current landfill near the park, off of Wood Rd.

The following links provide more information from Dewitt Township and Granger, respectively:

http://www.dewitttownship.org/OurDepartmentsServices/ParksampRecreation/CommunityParks/tabid/2101/Default.aspx
http://www.grangernet.com/about/grangerMeadows.php

Hunter Park, City of Lansing, MI

The park is 13 acres and is surrounded by single and multi family residencies. Uses include:

- Athletic Courts
- Water Pool/Playground
- Open Fields
- Picnic and Sheltered Areas
- Trail Network
- Community Garden

FIGURE 12: HUNTER PARK COMMUNITY GARDEN, LANSING, MI

As part of the city's five year park and recreation plan update, it was decided that Hunter Park should have its own master plan included in the document. Three organizations; Allen Neighborhood Association, Lansing Parks and Recreation Department, and Capital Consultants, Inc. helped to develop a plan based on input from community meetings. With the assistance of a State of Michigan Cool Cities Grant, additions (that were proposed in the master plan) to the park where implemented. A $100,000 grant was issued by Cool Cites for the purpose of a community garden and a paved perimeter path and the renovation of their existing pool.

Highlights of the community garden include:

- The project was completed May 10, 2008.
- The project has strengthened the surrounding neighborhoods. The Urban Gardener Certification project began in fall of 2008; there are garden mentors at the site about three times a year; Saturday workshops take place two to four times a month; and also there has been the Garden-in-a-box project, which has brought in forty-eight boxes.
- People in the area are able to grow their own food and also tend to the gardens.

- There has been a drastic increase in safety since people are at the park constantly and music fest is held there; the park is used by a coalition of churches; and there are summer picnics, showers, and birthday parties

(Cool Cities, 2010).

For more information on the Hunter Park master plan update see the following link:
http://www.allenneighborhoodcenter.org/hunterpark.html
For more information on the Cool Cities grant program and other Michigan projects see the following link:
http://www.coolcities.com/main.html

DISCUSSION

Not only do park and recreation hubs enhance the quality of life for residents in our region, they provide environmental, economic, health, and social benefits for all.

Environmental Benefits: Conserve, Enhance, and Quality

- Provide buffer between; land and water features and built and natural land cover
- Opportunities created for low-impact land use practices
- Reduce pollution and urban heat island effect,
    - 6% reduction of smog with presence of mature tree canopy (Wight, 2009).
    - 50 lbs of particulates can be intercepted from one rural tree a year (Wight, 2009).
- Enhance air quality for residents
- Protect significant natural features
- Protect and enhance natural biodiversity and ecological processes

"Parks alone are not sufficient to ensure key ecological functions are maintained" (Wight, 2009). It is important to consider the adjacent and surrounding areas of the park. (Ecological processes and systems are not always contained within the boundaries of the park.)
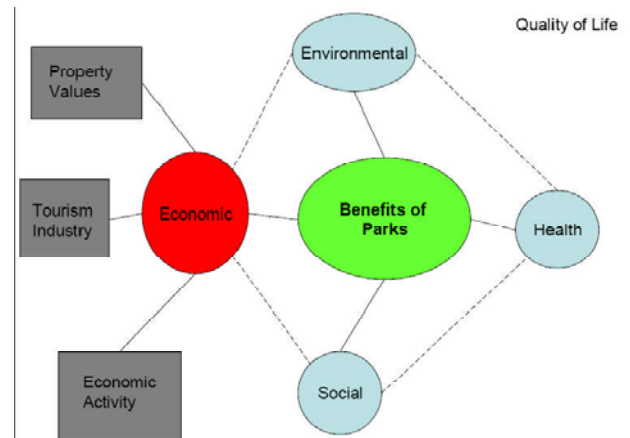
Economic Benefits: Health care costs, Economic Development, Property Value

"People who exercise regularly have 14 percent lower claims against their medical insurance, 30 percent fewer days in the hospital, and have 41 percent fewer claims greater than $5,000 ("Feasibility Study: Corporate Wellness Program", City of San Jose Department of Parks, Recreation, and Community Services, 1988).

They can be considered economic engines. If invested in, parks and recreation areas have the ability to:

- "Increase the value of nearby residential properties and commercial property values
- Increases property tax revenue
- Attracts businesses interested in high quality of life for employees
- Helps clean water and air, and prevent flooding – complementing more costly other approaches
- Attracts tourists and boosts recreational spending
- Requires space management, with associated jobs and local expenditures" (Wight, 2009).

Social Benefits: Building Character and Connecting Communities

There are various social benefits associated with parks and recreation areas. They include:

- The greater the opportunity and proximity people have to parks the more they will exercise, which declines obesity rates and mental/stress related problems.
- Increase in "Social Capital" for communities; leads to positive social interactions, stronger sense of community, and reconnecting people with nature.
- Crime reduction occurs with the presence of parks; Residents have a greater sense of community and a purpose to protect its health and well being.
- Parks and recreation areas are not amenities within the community but necessities that enhance social equity.

To end this section, it is advised for public agencies to intertwine parks and recreation areas with various planning documents to ensure cooperation, communication and connectivity within local and regional communities and organizations. The following is just a sample list of documents to consult:

- Community Master Plan

- Transportation Plan

- Non-Motorized Transportation Plan

- Open/Green Space Plan

A practical mindset to have:
"Kids Don't Need Equipment, They Need Opportunity."
Parks and recreation areas are not all about the amount of
resources a community has but how to efficiently use them.

URBAN FORESTRY

BACKGROUND

Urban forestry plays an important role in the development of green infrastructure hubs in the Tri-County region. The National Urban and Community Forestry Advisory Council, which advises the U.S. Forestry Service, defines urban forestry as "The art, science, and technology, of managing trees, forests, and natural systems, in and around cities, suburbs, and town for the health and wellbeing of all people" (NUCFAC).

Urban forestry is one of numerous environmental topics that have risen to the forefront of public awareness during the last 40 years, after the destruction of over 77 million trees nationwide due to the Dutch Elm Disease. More recently the Emerald Ash Borer led to the loss of 16 million trees in Michigan alone (Schwab, 2009). Particularly in the last two decades, scholars, practitioners, and community leaders have documented many more ways in which trees, especially as part of a regional or urban green ecosystem, help create an enhanced quality of life.

Much of the professional and scientific knowledge necessary for improving urban forest health and management is becoming more readily available. However, these resources are often overlooked by local citizens and politicians. When urban forestry programs fail, it is often because of the public or its elected officials do not fully appreciate the programs value and benefits.

METHODS OF IMPLEMENTATION

The state of Michigan has a Visiting Urban Forestry Program. The program provides communities with an opportunity to have an urban forest consultant visit and assess their urban forest resources. The Michigan DNRE provides funding to assist communities by arranging for consultants to tour the community, review current resource conditions, management plans, ordinances, and inventories, and provide written/verbal recommendations on how to continue or initiate new programs based on needs determined. This only lasts for one day and is a general assessment only. However, this is a good way for communities to begin brainstorming for their own urban forestry program. There is a small fee ranging from $100-$300 depending on the size of the community and funding from the state to support the program is not always available.

Successful forestry programs rely on the commitment of various players in the community. Program input must come from the following sources:

- A professional with a specialization in tree care and management. This may range from somebody who possesses a four year degree in arboriculture or forestry or simply someone who has had some specialized training on the subject. Where this professional works may also vary from a separate forestry department in a large city, public works or parks and recreation department in mid-sized communities or simply an outside contractor who oversees a forestry program.

- Planners. Planners are typically in an excellent position as coordinators of input from various city departments in the review of pending development applications and overall policy development related to managing growth. Planners are able to assist urban foresters with documenting existing conditions and making clear the best means of achieving long-term forest sustainability goals. Six planning principles that are designed to turn an urban forest program into reality are (Schwab, 2009):

    - Incorporate the tree ordinance in the development code and ensure consistency with other codes.
    - Collaborate with developers, environmentalists, and other stakeholders to draft ordinances.
    - Planned Unit Development regulations should include an urban forestry evaluation checklist or guidelines.
    - Ordinances must include provisions for enforcement personnel.
    - Take an adaptive management approach to resources.
    - Plan for long term maintenance of trees.

- Engineers. Engineers can interact with urban foresters in order to achieve environmental quality goals such as air pollution reduction, noise buffering, erosion control, and stormwater management. Transportation engineers also have the opportunity to work with the urban forester because of the many ways in which trees and road design affect each other, such as sight lines, traffic calming, and safety.

- Citizens and business leaders. Citizens often provide the glue that link open space networks in large metropolitan areas. This may be done by forming groups in response to the destruction of trees and other natural resources resulting from growth and development. Many citizens also volunteer and assist with tree-planting efforts in the region as well as provide the political backbone behind municipal efforts to sustain public investment in green infrastructure and the urban forest.

- Public officials. Effective forestry programs depend ultimately on the public policy supporting it. Be it financially, administratively, or legally. Mayors and council members shape the programs and lines of authority within departments under which urban forestry programs must operate.

It is important to think of urban forestry as being about "forests" and not simply as "trees." Effective programs require a big-picture approach which includes examining how the ecosystem supports urban life as well as the urban planning policies needed to support and maintain urban forest health. (Schwab, 2009). A growing number of communities are establishing goals for percentages of the city's surface covered by tree canopy as a means of furthering various environmental objectives. At a city scale, planners can interact with urban foresters in integrating canopy cover and other tree-related data into GIS and analytic tools.

Tree cover in urban areas east of the Mississippi has declined by about 30% 1990 while the foot print of the urban areas has increased by 20%. With this decline in tree cover, significant air and water management costs have increased. Tree cover is directly related to environmental quality. Maintaining a robust enough tree cover to function as green infrastructure reduces the need and expense of building gray infrastructure to manage air and water resources. The following table shows recommended tree canopy goals for suburban/urban settings (Setting Urban Tree Canopy Goals):

For metropolitan areas east of the Mississippi	
Average for all zones	40%
Suburban residential zones	50%
Urban Residential zones	25%
Central business district	15%

Source: American Forests

For more information on tree canopy goals, see the following link:
http://www.americanforests.org/resources/urbanforests/treedeficit.php

FUNDING

Funding for tree planting can come from various sources. Those sources may include but are not limited to the following:

- National Urban and Community Forestry Challenge Cost Grant
  - http://www.fs.fed.us/ucf/nucfac.html
- Michigan DNRE Grants Programs
  - Arbor Day Mini Grants
  - Community Forestry Grants
  - http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985---,00.html
- Local utility company grants
  - DTE Energy Foundation Tree Planting Grants
  - Consumers Energy
- Local general fund
- Capital improvement programs
- Local charitable organizations
- Private property owners

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

Although zoning and regulatory language may vary slightly between municipalities, there are several common elements found in successful urban forestry programs (Tree City Standards):

1. A tree board or department who is responsible for the care and management of the community's trees.
2. A tree ordinance that will provide clear guidance for planting, maintaining and removing trees from streets, parks and other public places. A tree ordinance should also be flexible enough to adapt to the changing circumstances of the community.
3. A list of appropriate species of trees for the community.
4. A minimum annual budget of at least $2 per capita.

City of East Lansing ordinances. Search "trees":
http://library1.municode.com/default-test/home.htm?infobase=13690&doc_action=whatsnew

City of Lansing ordinances. Search "trees":
http://library1.municode.com/default-now/home.htm?infobase=13231&doc_action=whatsnew

City of Ann Arbor Planting Recommendations:
http://www.a2gov.org/government/publicservices/fieldoperations/forestry/Pages/Welcometowwwa2govorgtrees.aspx

City of Lansing "The Trees of Lansing" Report. This report outlines over 90 species of trees along with a brief description and location of each:
http://www.lansingmi.gov/Lansing/parks/forestry/docs/trees_of_lansing.pdf

CASE STUDIES

Lansing, MI
Lansing recognized early on of the importance of trees on the quality of life of its residents. The first tree ordinance dates back to 1878 and has grown into an effective urban forestry program that serves as a model for other cities. As of April 2010, the city of Lansing is in the process of working on an inventory of its existing street trees.

For more information on the city of Lansing's forestry program, see the following link:
http://www.lansingmi.gov/parks/forestry/index.jsp

East Lansing, MI
The City of East Lansing's *Street Tree Inventory* includes trees located in the public right-of-way (ROW) as well as important information such as species, size and condition of individual trees. It is a great tool that allows the city to effectively manage its urban forest.

For more information on the *Street Tree Inventory*, see the following link:
http://trees.cityofeastlansing.com/tk7/

Ann Arbor, MI

The City of Ann Arbor performed a study of their urban forestry that concluded in July 2009. Below is a list of calculated benefits that their urban trees provide:

- Reduces stormwater runoff:
  - Ann Arbors public trees intercept 65 million gallons of stormwater annually for a total savings of $519,895. The average value per tree is $10.98.
- Reduces the heat island effect:
  - Ann Arbors public trees reduce energy and natural gas use from shading and climate effects for a total savings valued at $2,252,055. This averages out to $47.55 per tree.
- Reduces air pollution:
  - Public trees in Ann Arbor reduce atmospheric carbon dioxide by 7,851 tons per year. This savings is valued at $52,450.
  - The net air quality improvement provided by the street tree population from the removal and avoidance of air pollutants is valued at $395,569 per year, with an average net benefit per tree of $10.98.
- Increases property values:
  - The estimated total annual benefit associated with increased property values, aesthetics, and other less tangible improvements is $1,368,302 per year.

Ann Arbor's tree related expenditures are approximately $1,710,000 per year (0.6% of total budget). The net benefit to the City is $2,878,470. The average net benefit per tree is $60.78 per year. The City of Ann Arbor receives $2.68 in benefits for every $1 spent on its municipal forestry program.

For more information on Ann Arbor's tree inventory, see the following link:
http://www.a2gov.org/government/publicservices/fieldoperations/forestry/Documents/SummaryReport_CalculatedPublicTreeValuesAndBenefits.pdf

DISCUSSION

There are numerous benefits to implementing an urban forestry program. These benefits are often misunderstood by local officials who fail to implement a local urban forestry program (USDA Forestry Service).

- Trees reduce heat in cities and save energy
  - Strategically planted urban trees reduce energy use by shading buildings in summer and blocking cold winter winds
- Trees improve air quality

- o Trees absorb gaseous pollutants through their leaves
- Trees strengthen quality of place and the local economy
  - o Increase property values by 10 to 20 % and attract more homebuyers
  - o Increase municipal revenue through property tax assessments
  - o Urban parks provide the settings for festival and other special events that add millions of dollars to the local economy
- Trees reduce stormwater runoff
  - o Trees act as sponges that keep water onsite and recharge the groundwater
  - o A typical urban forest of 10,000 trees will retain 10 million gallons of rainwater per year
  - o Reduce the amount of runoff and pollutants into creeks
- Trees help promote smart growth
  - o Strengthen the urban core by improving public social space and the walking experience
  - o Give people access to nature in the city
  - o Add breathing room to more compact development
  - o Separate incompatible uses and buffer noise pollution
- Trees create walkable communities
  - o Tree-lined streets encourage people to walk in their communities and walk further
  - o Street trees have been shown to calm traffic through neighborhoods

There are also a few challenges to implementing an urban forestry program for local governments:

- Competition with other programs for funding
- Many citizens and local officials are unaware of urban forestry benefits
- Requires stable funding for long-term maintenance

GREENING MID-MICHIGAN TOOLKIT: SITE TOOLS
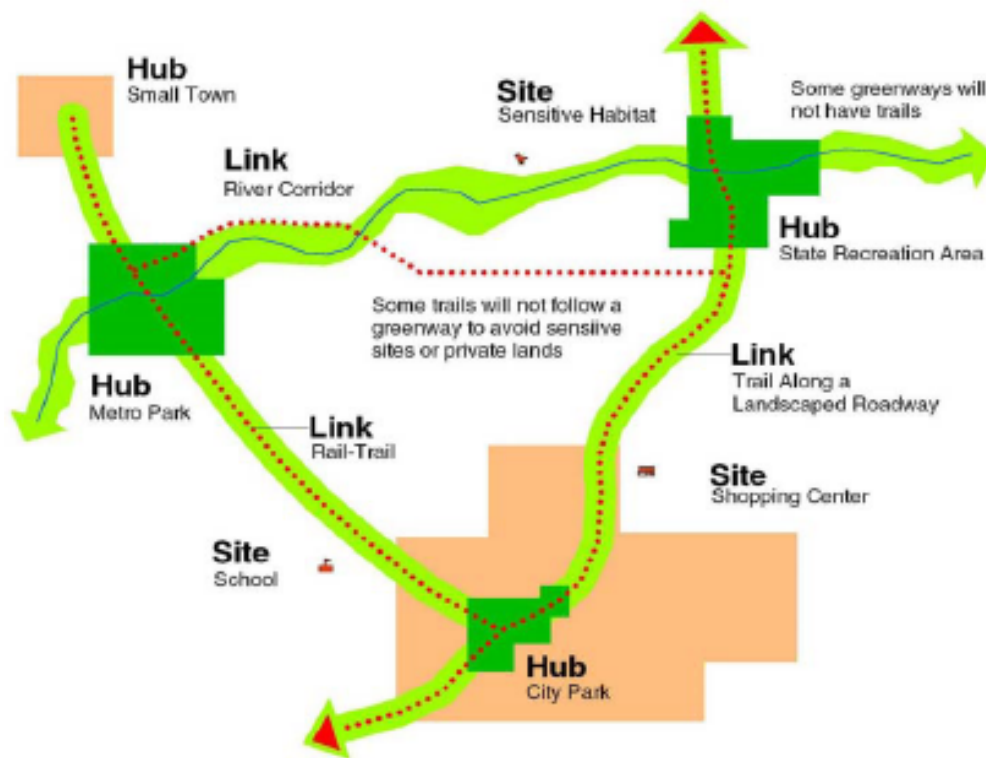
Sites are considered as other area attractions and can consist of: Schools, Shopping Centers, Entertainment Areas, Green buildings, Historic Buildings/Districts, etc.

LOW IMPACT DEVELOPMENT (LID)

BACKGROUND

As stated by the United States Environmental Protection Agency (EPA), "LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product." (Agency - LID, U.S. Environmental Protection, 2009).

According to the EPA, "LID techniques can help jurisdictions meet five of the six minimum requirements under National Pollutant Discharge Elimination (NPDES) Phase II requirements, including: public education and outreach, public participation, construction site and post-construction runoff control, and pollution prevention/good housekeeping." (Agency - Municipal, U.S. Environmental Protection, 2009). The NPDES requirements were expanded on with the Stormwater Phase II Rule by the EPA in 1999. (Low Impact Development Center - NPDES PH. II, 2005). "The Rule requires Phase II communities to develop stormwater management programs that:

1. Reduce the discharge of pollutants to the maximum extent practicable (MEP);
2. Protect water quality; and
3. Satisfy the appropriate water quality requirements of the Clean Water Act.

In the Rule, EPA also established six minimum control measures that Phase II communities are required to implement:

1. Public education and outreach;
2. Public participation / involvement;
3. Illicit discharge connection and elimination;
4. Construction site runoff control;
5. Post-construction runoff control; and
6. Pollution prevention / good housekeeping.

In addition to adopting the six minimum control measures, communities will also need to identify and select and a stormwater control strategy and BMPs that satisfy the maximum extent practicable standard." (Low Impact Development Center - NPDES PH. II, 2005).

There are many methods of LID that have been used in various situations ranging greatly in the amount of stormwater each method handles. These methods are listed in detail below:

Rain Barrels & Cisterns

Rain barrels, as shown in Figure 13, are a small scale containers used for capturing roof stormwater runoff through a system of downspouts. They are an effective, low cost, and low maintenance way of acquiring water for irrigation. Rain barrels can be used in residential, commercial, or industrial developments, and can be easily retrofitted to existing uses.

FIGURE 13: RAIN BARREL

Cisterns, like rain barrels, are used for capturing roof stormwater runoff. However, they are on a relatively larger scale and are typically used for water supply. Cisterns can be above ground, as shown in Figure 14, or underground containers that can hold up to 10,000 gallons.

FIGURE 14: CISTERN

See the following link for more information on rain barrels & cisterns: http://www.lid-stormwater.net/raincist_home.htm

Bio-retention Facilities

"Also known as a rain garden, a bio-retention facility consists of a porous soil covered with a thin layer of mulch. A stand of various grasses, shrubs, and small trees is established to promote evapo-transpiration, maintain soil porosity, encourage biological activity, and promote uptake of some pollutants. Runoff from an impervious area is directed into the bio-retention facility. The water infiltrates through the plant/mulch/soil environment, providing the treatment." (University of Maryland - James A Clark School of Engineering, 2010). Bio-retention facilities can be used in many applications such as on private sites & along roadways as shown in Figure 15, to provide stormwater treatment prior to entering into the storm system.

FIGURE 15: MICHIGAN AVENUE RAIN GARDENS

See the following link for more information on bio-retention facilities:
http://www.lid-stormwater.net/bio_benefits.htm

Permeable Pavements

Permeable pavements are a new technology within the last 10 to 15 years. They act as a hard surface, but allow water to seep through to the soil below. They range from interlocking pavers to concrete / asphalt solutions, as shown in Figure 16. Permeable pavements can be used for parking lots, bike trails, walkways, low traffic roadways, etc. They drastically reduce the amount of runoff from an impervious surface, but direct it to a perforated tile system underneath. Prior to entering the system, the stormwater has an opportunity to filter through sand and gravel prior to draining at the outfall of the system.

FIGURE 16: PERMEABLE PAVEMENT

See the following link for more information on permeable pavements:
http://www.lid-stormwater.net/permpavers_benefits.htm

Green Roofs

Green roofs, as shown in Figure 17, are vegetated roofs designed with the intention to capture roof stormwater prior to entering the roof drainage system and on to the ground below. There are many aspects involved in the design of a green roof. First and foremost, the building structure needs to be designed to accommodate the additional load of the plant material and associated resources. Secondly, roof barriers, root barriers, and insulation need to

FIGURE 17: GREEN ROOF

be installed prior to the vegetated plant material. Finally the growing medium is placed within a fitted bed container and planted with the desired plant material. One typical green roof plant material is seedum, which will grow in a thin stone layer and is very easily maintained.

Green roofs provide stormwater management benefits by: (Low Impact Development Center, 2007)

- Utilizing the biological, physical, and chemical processes found in the plant and soil complex to prevent airborne pollutants from entering the storm drain system.

- Reducing the runoff volume and peak discharge rate by holding back and slowing down the water that would otherwise flow quickly into the storm drain system.

Green roofs are not only aesthetically pleasing, but they also: (Low Impact Development Center, 2007)

- Reduce city "heat island" effect
- Reduce CO_2 impact
- Reduce summer air conditioning cost
- Reduce winter heat demands
- Potentially lengthen roof life 2 to 3 times
- Treat nitrogen pollution in rain
- Negate acid rain effect
- Help reduce volume and peak rates of stormwater maintained.

See the following link for more information on green roofs:
http://www.lid-stormwater.net/greenroofs_home.htm

Riparian Buffer Zones

Riparian buffer zones are used in areas where impervious surfaces such as roadways, parking lots, walkways, etc., lie within a minimal distance to a water body such as streams, creeks, rivers, lakes, ponds, drains, etc. They can also be used between farmlands and water bodies, as shown in Figure 18, to control sediment runoff into the water body. The buffer zone is an area that lies between the water body and the impervious surface, and is typically planted with ferns, grasses, and shrubs that are natural to the region. The stormwater from the impervious surface then flows through the vegetated buffer, removing a substantial amount of impurities collected from the impervious surface, prior to entering the water body. These buffer zones are a natural way of purifying the water.

FIGURE 18: RIPARIAN BUFFER ZONE

See the following link for more information on riparian buffer zones:
http://www.riparianbuffers.umd.edu/manuals/correll.html

The implementation of these and other LID methods will help to manage stormwater and reduce the impact of human development to the natural surroundings, ecosystem, and watershed. LID has the ability to restore and maintain a watershed's hydrologic and ecological functions when applies on a

broad scale, for example throughout a community or region. "LID has been characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others." (Agency - LID, U.S. Environmental Protection, 2009).

See the following link to the EPA document for LID techniques not covered in this document: http://www.epa.gov/ne/npdes/stormwater/assets/pdfs/IncorporatingLID.pdf

Also, see the following link to the Michigan Low Impact Development Manual for more information: http://www.mywatersheds.org/publications/LID/LIDManual.pdf

METHODS OF IMPLEMENTATION

In the majority of substantial construction projects, developers and property owners are required to submit plans to municipalities and authorities for review. Here in the tri-county region, construction projects must go typically go through the local municipality (either a township or city/village), county road commission, and the county drain commissioner's office. Along with the region's municipalities, developers and private citizens of the region must also be informed and encouraged to use the LID techniques. Thus, local educational seminars for the public are encouraged. The EPA has provided key steps for each party.

For Municipalities

The EPA provides guidelines to municipalities for implementing LID techniques into their jurisdictions. The EPA recommends municipalities to follow the steps listed below to successfully implement and promote LID within their community:

- Update development and redevelopment standards and pass ordinances with LID incentives.
- Require LID for capital improvement projects and educate maintenance crews.
- Educate designers and developers.
- Establish a maintenance tracking system.
- Quantify the benefits of LID.
- Grant credit for LID and conservation measures.
- Consider drinking water sources.

See the following link to the EPA document for more information:
http://www.epa.gov/ne/npdes/stormwater/assets/pdfs/IncorporatingLID.pdf

For Developers / Citizens

The EPA provides guidelines to developers for following LID techniques into their developments. The EPA recommends developers to follow the steps listed below to ensure future developments meet the EPA's and the municipalities' standards:

- Review new requirements and standards.
- Get early buy-in for stormwater BMP plans.
- Design for long-term maintenance.
- Phase construction activities and practice site fingerprinting.
- Revise corporate policies to promote LID.

See the following link to the EPA document for more information:
http://www.epa.gov/ne/npdes/stormwater/assets/pdfs/IncorporatingLID.pdf

FUNDING

Funding LID firstly depends on the type of project. In most cases, a privately owned site would be funded by the owner or developer completing the construction. Implementing LID for community stormwater solutions requires funding mechanisms for municipalities to cover the costs similarly to storm sewer infrastructure. The EPA provides documentation on several funding options for communities to implement in order to pay for LID. The most common types of funding are:

Service Fees (including stormwater utilities) – Similar to charging for water through meters, stormwater fees are based on property type or area, and provide for regulatory costs and maintenance of the system.

Property Taxes / General Fund – A local entity may choose to use its general fund to support low impact development.

Special Assessment Districts or Regional Funding Mechanisms – Districts may be established over a region based on the existing watershed areas. Funding can be managed by a regional authority such as a soil and water conservation district or drain commission. Funding can involve fees and / or credits, depending on what type of improvements are made on individual properties.

System Development Charges (SDCs) – SDCs are one time charges to new customers similar to the charging for a water main connection.

Grants and Low-Interest Loans – Grants may be available for stormwater solutions on a state-by-state basis similar to the Clean Water or Drinking Water State Revolving Fund. Loans could be taken out to setup districts and repaid once fees are established.

See the following link to the EPA document for more information:
http://www.epa.gov/ne/npdes/stormwater/assets/pdfs/FundingStormwater.pdf

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

Concerns of design issues, zoning regulations, community involvement, etc can all be protected by enforcing the correct ordinance language and by-laws. The EPA provides many solutions for implementation, many of which are from east coast communities who have been practicing LID for the last 10 to 15 years.

Vermont League of Cities & Towns has created a document of by-laws for the design and installation of LID resources. See the following link for more information:
http://resources.vlct.org/u/o_LID-secured.pdf

The state of Rhode Island has created and Urban Environmental Design Manual and a Conservation Development Manual to guide LID design and installation. See the following links for more information:
http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/urbman.pdf
http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/condev.pdf

The state of New Hampshire has created an Environmental Characteristics Zoning manual for guidance of LID design and installation. See the following link for more information:
http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_2.1.pdf

The state of Michigan has created a Low Impact Development Manual for state specific design and installation guidelines. See the following link for more information:
http://www.mywatersheds.org/publications/LID/LIDManual.pdf

CASE STUDIES

<u>Lawrence Technological University, MI</u>

The A. Alfred Tauban Student Services Center is a 42,000 square foot building located on the Lawrence Technological University Campus in Southfield, Michigan, Oakland County. The building has a 10,000 square-foot vegetated roof. With layers of insulation, drainage fabric, granular composition, and nine different species of sedum ground cover, the roof has a nine inch thick layer of more effective insulation than traditional roofs and is expected to have a lifespan twice as long. The roof absorbs approximately 60 percent of the stormwater, while the remaining will flow into a 10,000-gallon underground cistern to be used as "gray" water for flushing toilets and water lawns. The university has also installed a 725 linear foot by 15 foot wide bio swale (rain garden) consisting of a system of weirs, tile fields, and native vegetation for

collecting and filtering 60 percent of stormwater prior to discharging into the Rouge River. (SEMCOG, 2008).

For more information on the Lawrence Technological University case study and other Michigan case studies, see the following link:
http://www.semcog.org/uploadedfiles/Programs_and_Projects/Water/Stormwater/LID/LID_Manual_chapter10.pdf

For additional local case studies, see the case studies listed under the Green Building Tool Section as the majority of these have implemented low impact development methods.

DISCUSSION

LID improvements have many benefits as previously discussed. They are a viable solution for cleaning the stormwater prior to it returning into the streams, rivers, water table, and lakes. Protecting our streams, rivers, and lakes is crucial to protecting water for drinking and other uses.

Concerns with LID seem to be more on the design side than whether or not it actually works. Several of the LID methods listed above can have less success if not designed correctly or used in the correct applications. For instance, pervious concrete, it seems like a great product and is really quite amazing to see water pour through concrete and asphalt, however, structural failures are of major concern. Manufacturers claim it can withstand heavy loading and traffic, but the length of its lifespan is uncertain. Typically pavement designs are around the 15 to 20 year range. Michigan has destructive freeze and thaw periods which can be witnessed on the roadways throughout the winter months. Pervious pavements only work because they have voids between the larger stones throughout the mixture allowing water to pass through. However, not all the water can pass through; some may end up freezing inside. Though the use seems discouraged, pervious concrete can be a great low impact development use in certain applications.

Rain gardens bring up additional design concerns such as storage capacity and rainfall intake. Ultimately, the stormwater must be routed to some location through perforated drain tiles, otherwise flooding may occur as the plant material and soils may not be able to handle extreme rainfall intensities. Ensuring proper design and installation are essential to their effectiveness.

GREEN BUILDING

BACKGROUND

As defined by the Environmental Protection Agency (EPA), "Green, or sustainable, building is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition." (Agency - Green Building, 2009). The construction process has major impacts on the environment such as:

Aspects of Built Environment:	Consumption:	Environmental Effects:	Ultimate Effects :
Siting Design Construction Operation Maintenance Renovation Deconstruction	Energy Water Materials Natural Resources	Waste Air pollution Water pollution Indoor pollution Heat islands Stormwater runoff Noise	Harm to Human Health Environment Degradation Loss of Resources

(Agency - Green Building, 2009)

Green building reduces the impact of the various components of construction projects on the environment through sustainable practices in site and building construction. There are a number of programs to help guide the green building process, such as: Leadership in Energy and Environmental Design (LEED), Energy Star, Water Efficiency, Environmental Preferable Building Materials and Specifications, Waste Reduction, Toxic Reduction, Indoor Air Quality, Smart Growth and Sustainable Development.

Leadership in Energy and Environmental Design (LEED)
According to the U.S. Green Building Council (USGBC), "LEED is an internationally recognized green building certification system, providing third-party verification that a building or a community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts." (USGBC, 2010). Users of the LEED process earn credits in several categories associated with green buildings. These differ by the type of LEED certification, but generally include: sustainable sites, water efficiency, energy & atmosphere, materials & resources, indoor environmental quality, and innovation. While each category may have required prerequisites that must be met, for the bulk of the credits

required for certification users can choose in which categories they wish to focus based on their own priorities. Users include: architects, real estate professionals, facility managers, engineers, interior designers, landscape architects, construction managers, lenders, and government officials.

"LEED was designed to encourage and accelerate global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted standards, tools, and performance criteria." (USGBC, 2010). Rating systems have been created for determining the LEED certification level of the various types of projects encountered. The rating levels are as follows: platinum, gold, silver, & certified.

See the following link for more information on the rating systems of LEED:
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222

Energy Star

Energy star is a program developed by the EPA and the U.S. Department of Energy. The program "promotes partnerships with homebuilders, office building managers, product manufacturers, and many other organizations to improve the energy efficiency of homes, buildings, and various building components and appliances." (Agency - Green Building, 2009). The program states that "Americans…saved enough energy in 2009 alone to avoid greenhouse gas emissions equivalent to those from 30 million cars – all while saving nearly $17 billion on their utility bills." (U.S. Environmental Protection Agency, U.S. Department of Energy, 2010).

See the following links for more information on Energy Star:
http://www.energystar.gov/

Water Sense

"Water Sense is an EPA-sponsored partnership program that seeks to protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices." (Agency - Water Sense, United States Environmental Protection, 2010). The program brings together manufacturers, retailers and distributors, and utilities that meet the program's water use standards to:

- Decrease indoor and outdoor non-agricultural water use through the adoption of more efficient products and practices.
- Help consumers make water-efficient choices, including differentiating between products and services in the marketplace and adopting simple daily activities that reduce water use.
- Encourage innovation in manufacturing
- Establish and standardize rigorous certification criteria that ensure product efficiency, performance, and quality.

See the following link for more information about the Water Sense program:
http://www.epa.gov/watersense/

These are only a few of the available programs that help promote the green building initiative, see the following link for more information on the EPA Green Building Programs:
http://www.epa.gov/greenbuilding/pubs/components.htm

METHODS OF IMPLEMENTATION

The USGBC has committed itself to providing guidance for development and implementation of green building programs to federal, state, and local governments. The USGBC has provided documentation for implementing green building programs. These programs thrive when they are aligned with the objectives of other government initiatives. The numerous benefits of green facilities enable a green building program to make a significant contribution to existing programs aimed at resource efficiency, environmental health, and sustainable development.

At the same time, the success of a green building program often depends on drawing from and coordinating the existing expertise of other departments and programs. Related programs include:

- • Community Health
- • Economic Development
- • Energy Management
- • Environmentally Preferable Purchasing
- • Infrastructure Development
- • Public Open Space Planning
- • Smart Growth
- • Transportation Planning
- • Waste Management

For more information on green building implementation guidance, see the following link:
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1779

FUNDING

There are many funding options available for green buildings at the national, state, and local levels available for homeowners, industry, government organizations, and non-profits. However, funding options for green buildings can vary by state and locality. In addition, as the green movement continues to grow, funding options will most likely increase as well. Current funding options are as follows:

National Level

The Office of Energy Efficiency and Renewable Energy (EERE)

The EERE office works with business, industry, universities, and others to increase the use of renewable energy and energy efficiency technologies. They offer many funding options for buildings that strive to reduce energy usage.

Enterprise Green Communities

Green Communities provides grants, financing, tax-credit equity, and technical assistance to developers who meet the criteria for affordable housing that promotes health, conserves energy and natural resources, and provides easy access to jobs, schools and services.

Federal Government – Federal Tax Credits for Energy Efficiency

The Energy Policy Act of 2005 includes tax credits to consumers for energy efficiency home improvements, specific automobiles, and installation of solar energy systems and fuel cells. Tax credits are also available for home builders and appliance manufacturers, and tax deductions are available for commercial buildings that meet specific efficiency standards.

Several other national level funding options are listed on the EPA website. For more information on these funding options, see the following link:
http://www.epa.gov/greenbuilding/tools/funding.htm#national

State Level

The Michigan Department of Environmental Quality (MDEQ) has provided a document listing some of the funding options in the State of Michigan for green buildings. See Appendix I or the following link for information on these funding options:
www.deq.state.mi.us/documents/deq-ess-p2-green-funding.doc

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

As stated by the USGBC, "various LEED initiatives including legislation, executive orders, resolutions, ordinances, policies, and initiatives are found in 45 states, including 202 localities (138 cities, 36 counties, and 28 towns), 34 state governments (including the Commonwealth of Puerto Rico), 14 federal agencies or departments, 17 public school jurisdictions, and 41 institutions of higher education across the United States." (USGBC, 2010).

See the following link for more information:
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852

CASE STUDIES

The following case studies are just a few of the green buildings found across the state and more particularly in the tri-county region. These buildings have all received some level of LEED certification, and can be found on the LEED website. The tri-county region currently has 8 recorded and certified green buildings, however, there are approximately 16 buildings at the registration level that may receive certification in the near future. The following link provides access to the LEED global database of certified and registered buildings:

http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?ID=10044769&CMSPageID=244

Michigan State University Federal Credit Union (MSUFCU) Headquarters – North of East Lansing

MSUFCU 137,000 square foot headquarters office building is seeking to be certified as LEED Silver. If successful, it will be the third largest green building in the state, behind GM's Delta Plant and Delta Dental's Okemos headquarters. Excerpts from the Lansing City Pulse article "Greener and Greener" are below:

"The paint doesn't smell like anything, and the air smells like air. Sounds and sights are equally merciful: cooled or heated air drifts silently from raised floors and clerks tap out transactions by filtered sunlight. If all that isn't healthy enough, employees can go to an in-house fitness center or jog off their lunch on a mile-long ribbon of trail that winds around the building through flowery meadows and low-maintenance grass. The meadows are designed and maintained by M SU horticultural profs and will double as grist for scientific study."
(SEMCOG, 2008).

"Still, however green the building is, it's no shrinking violet. Motorists on U.S. 127 do a double-take at the huge glass monetarium that looms over the cornfields, at 137,000 square feet a stark testament to the Credit Union's staggering growth." (SEMCOG, 2008).

"The Credit Union's last major build, its Crescent Drive offices, became obsolete almost as soon as it was finished in 1998. By 2003, 80 employees were working in leased office space. The new building will house 330 employees when fully staffed in mid-October (2009), and there's plenty of room on the 33-acre campus for more buildings." (SEMCOG, 2008).

See the following link to view the whole article:
http://npaper-wehaa.com/citypulse/f0uyVrXjHw5jSNAN/#?article=74964

GREEN BUILDING

Sam Corey Senior Center (Delhi Senior Center) – Holt, MI

Delhi Senior Center is an approximately 5,000 square foot building designed and constructed for the activities and fellowship of the local senior citizens. The building was funded by the Delhi DDA, and has become the first LEED-Certified building in Delhi Township. The building uses a geothermal heating and cooling system along with a Live Roof™ system. The site has also been designed with rain gardens to manage storm water, as well as specific parking spaces for high gas mileage/high capacity vehicles. The senior center currently hosts several events, including Wednesday lunches that boast an attendance of more than 150 seniors. The facility also offers free exercise programs, card games, bingo and musical entertainment.

See the following links for more information and a virtual tour of the building:
http://delhitownship.com/parks-SeniorCenter.htm
http://delhidda.com/community/senior-center1.html

Delta Township Library – Lansing, MI

The Delta Township Library opened it's doors on Saturday, June 14th 2008, as one of the first LEED Certified municipal buildings in Delta Township. The building actually received the LEED Silver Certification. The building offers many new amenities:

- A children's area with stage, puppet theater, puzzles and toys
- A teen area with computers and tv
- A browsing area around a central fireplace
- Expanded shelving for books, cds, dvds and audiobooks
- The Lisa K. Mclean room, featuring a collection which celebrates women's history
- A dedicated local history room to develop a delta township-focused collection
- The elmwood room, a space to hold community events and library programs
- A healthy environment for staff and the community achieved through green building standards

See the following link for more information:
http://www.dtdl.org/index.php/about-us/building/

General Motors Plant – Lansing, MI

The General Motors plant in Delta Township is currently the State's largest green building and LEED certified building. The plant received the LEED Gold Certification for its well recognized use of superior energy and environmental design and construction. The building is currently the only LEED certified automotive manufacturing plant in the world. The plant is approximately 2.4 million square feet and will have approximately 3,000 team members when in full production. Some of the environmental highlights of the Lansing Delta Township plant include:

Energy and Atmosphere

- Energy efficiency was designed into most systems, resulting in energy costs that are 45 percent lower than industry standards, with a projected savings of $1 million per year.
- Bright task lighting and lower overhead lighting levels reduced lighting energy used in the plant by 20 percent, or 3 million kwh annually.
- The 1.5 million square foot roof is made of a special white polymer that reduces heat absorption, resulting in reduced costs to cool the building.
- No ozone-depleting substances (CFCs, HCFCs or halons) are used in any of the building's heating and cooling, refrigeration, and fire suppression systems.

Materials and Resources

- Of the construction materials used for the plant, more than 25 percent was composed of recycled content.
- More than 60 percent of all materials used in the construction of the building were sourced through manufacturers located within 500 miles, supporting the local economy and reducing transportation energy costs.
- Of the waste generated during construction, 80 percent, or 3,963 tons, was diverted from landfills.

Water Efficiency

- Non-manufacturing water use has been reduced by 45 percent, for a savings of over 4.1 million gallons of water annually.
- Rainwater is collected from the roof by a cutting-edge roof drain system. It is then stored in cisterns above rest rooms and is used instead of potable water to flush toilets.
- Waterless urinals that use a filter-based technology save over 1 million gallons of water annually.

Sustainable Site

- 50 percent of the site was left undeveloped. 75 acres has been set aside to preserve existing plants and wildlife habitat.
- Storm water at the site is managed through an innovative system that uses unpaved ditches and culverts. This system allows much of the water to be naturally absorbed into the soil and groundwater in the area, and filters out solids before water leaves the site.
- All landscaping added to the site consists of either native species or specially adapted drought-resistant plants to eliminate the need for an irrigation system.

For more information, please see the following links:
http://www.reliableplant.com/Read/2221/gm-opens-first-ever-leed-gold-certified-plant
http://www.usgbc.org/News/USGBCInTheNewsDetails.aspx?ID=2501

DISCUSSION

Green building has been in the forefront of development, whether retrofitting an existing building or a complete new construction site. Many benefits have been realized through the LEED program alone:

Environmental benefits:
- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

Economic benefits:
- Reduce operating costs
- Enhance asset value and profits
- Improve employee productivity and satisfaction
- Optimize life-cycle economic performance

Health and community benefits:
- Improve air, thermal, and acoustic environments
- Enhance occupant comfort and health
- Minimize strain on local infrastructure
- Contribute to overall quality of life

With the many benefits, come the negative aspects of Green building with the LEED program. Some of which are:

- Design can be more costly as additional paperwork needs to be completed for the LEED certifications.

- Green products may be more costly, however with its popularity, prices have fallen.

With the many green infrastructure items that can be implemented through green building, all building construction must follow the State of Michigan building code. Currently the Michigan building code has not adopted any aspects of green infrastructure; however in the coming years green infrastructure code could be adopted into the state code. See the following link to access the State of Michigan building code:
http://www.state.mi.us/orr/emi/admincode.asp?AdminCode=Single&Admin_Num=40830401&Dpt=CI& RngHigh=

HISTORIC PRESERVATION

BACKGROUND

Historic preservation enhances the quality of our environment and lives. With the use of historic preservation, urban areas find renewal; small towns retain the character that set them apart from other communities, neighborhoods are reclaimed from decline and are revived, and cultural landscapes are protected from uncontrolled development. According to Michigan's State Historic Preservation Office, "historic preservation is more than an attempt to maintain old buildings for posterity's sake; it serves as a planning and economic development tool that enables communities to manage how they will grow and change"(Michigan State Historic Preservation Office).   Once historic sites are identified and registered, protection programs and tax incentives can be used to preserve them. A commitment to the preservation of the character of our communities makes good economic sense because it enhances property values, creates jobs, revitalizes downtowns, and promotes tourism.

In 1966, in response to growing public interest in historic preservation, Congress passed the National Historic Preservation Act. The act required that each state establish a State Historic Preservation Office (SHPO) and that the governor of each state appoint an officer to oversee the preservation activities.   Each year Michigan receives a Historic Preservation Fund grant from the National Park Service to operate its program.   The Michigan SHPO identifies, evaluates, registers, interprets and protects the state's historic properties. The main function of Michigan's SHPO is to provide technical assistance to local communities in their efforts to identify, evaluate, designate, and protect Michigan's historic resources. The SHPO also administers an incentives program that includes state and federal tax credits and pass-through grants available to Certified Local Governments (Michigan State Historic Preservation Office).

Michigan's State Historic Preservation Office:
http://www.michigan.gov/mshda/0,1607,7-141-54317-53069--,00.html

METHODS OF IMPLEMENTATION

Historic buildings are tangible links with the past and they help give a community a sense of identity, stability and orientation. Historic preservation enhances the quality of the surrounding environment, provides renewal for urban areas, allows small towns to retain their original character, and protects landscapes from uncontrolled development.   The federal and state governments encourage the preservation of historic buildings through various programs including federal and state income tax incentives and grant programs to support the rehabilitation of historic and older buildings (The National Register of Historic Places in Michigan).

How to register for Historic Places in MI:
http://www.michigan.gov/mshda/0,1607,7-141-54317_54370_20845---,00.html

The Michigan Main Street Center (MMSC) at the Michigan State Housing Development Authority (MSHDA) is part of the Specialized Assistance and Revitalization Strategy division that has developed three programs designed to give historic downtowns and traditional neighborhood commercial districts an advantage in their efforts to redevelop commercial, residential and mixed use properties. These three programs are Michigan Main Street, Blueprints for Michigan's Downtowns, and Downtown Market Analysis.

The aim of Michigan Main Street is for Michigan's downtowns to revitalize and grow into thriving traditional centers of commerce for people and business. These healthy and vibrant downtowns are part of a larger strategy to retain and attract young people, professionals and high tech companies to the State of Michigan. Michigan Main Street has developed a Four-Point Approach that is intended to save historic commercial architecture and community fabric, while also aiding in economic development. According to the MMSC, this approach is a community driven, comprehensive strategy encouraging economic development through historic preservation in ways appropriate to today's marketplace. The following bullets detail the Four-Point Approach according to the MMSC (Michigan Main Street Center, 2008).

- Design:
  o Design enhances the downtown's physical environment by capitalizing on its best assets, and creating an inviting atmosphere through attractive window displays, parking areas, building improvements, streetscapes and landscaping.
- Economic Restructuring:
  o Restructuring is achieved by strengthening a community's existing economic base while also expanding and diversifying it. By helping existing business expand and recruiting new ones to respond to today's market, the Program helps to convert unused space into productive property and sharpen the competitiveness of business enterprises.
- Promotion:
  o Promotion is necessary to market the downtown's unique characteristics to residents, visitors, investors and business owners. It develops a positive promotional strategy through advertising, retail activities, special events and marketing campaigns to encourage commercial activity and investment in the area.
- Organization:
  o Organizing all the downtown stakeholders gets everyone working toward a common goal and drives Main Street, volunteer-based program forward. The fundamental organization structure consists of a governing board and standing committees. Volunteers are coordinated and supported by a paid program director. This structure not only divides the workload and delineates responsibilities, but also builds consensus and cooperation among the various stakeholders.

When a community becomes a part of the Main Street Program it can experience a return of economic activity through the three different levels of the program, each of which is designed to assist the community in tackling increasingly more sophisticated downtown or traditional neighborhood commercial district revitalization efforts. The first level is the Associate Community, which provides services for one year Main Street community members that complete all of the necessary training. Once one year level requirements are completed, a community can apply to become a Selected Community which is meant to assist communities in implementing the Main Street Four-Point Approach. A Main Street Program community can apply to become a Master Community when successfully completing five years in the Selected Level Program. As of 2008 there were thirteen Main Street Master and Selected Level communities in Michigan which are: Boyne City, Calumet, Clare, Grand Haven, Howell, Iron Mountain, Old Town Lansing, Manistee, Marshall, Muskegon, Niles, Portland, and Scottville. Also as of 2008, Mt. Pleasant and Owosso were considered Associate Main Street Communities by the Michigan State Housing Development Authority (MSHDA) (Michigan Main Street Center, 2008).

The Blueprints for Michigan's Downtowns Program is a competitive program that communities may apply for in order to receive economic consulting with a recognized firm. MSHDA contracts this program with a consulting firm that is specialized in the economic enhancement of traditional downtowns. If selected, a community will be paired with a consulting firm and MSHDA pays for fifty percent of the total cost of the consultants. As of January 2010, the Blueprints program is in the revision process and a new version will be presented in late 2010 or early 2011.

The Downtown Market Analysis Program provides communities with a realistic economic snapshot of what their historic downtown or traditional neighborhood commercial district can support. This analysis provides information in the areas of commercial goods and services as well as gauges the potential for additional residential development. These Downtown market Analyses are done on a continuous basis and the Michigan Main Street Center at MSHDA can be contacted at the following email address for more information: info@michiganmainstreetcenter.org

The previous information was obtained from the Michigan Main Street Center brochure which can be found at the following link:
http://www.michiganmainstreetcenter.com/LinkClick.aspx?fileticket=m_uX02_izhg%3d&tabid=67

FUNDING

The National Historic Preservation Act of 1966 provides federal government funds for projects designed to identify, assess, designate and protect districts, sites, buildings, structures and objects significant in the history, architecture, archeology, engineering and culture of the United States. The funds, received annually from the National Park Service of the U.S. Department of the Interior, are administered by Michigan's State Historic Preservation Office (SHPO), Michigan Historical Center.

The Historic Preservation Fund is the source of a 60-40 matching grant-in-aid program:

- 60% of the grant is provided through federal funds
- 40% of the grant is based on private, local, state and donated services

The federal funds provided through the grant must be matched by the grant recipient with private funds, local government funds, in-kind services, state funds, certain federal funds (limitations apply), donated services and/or donated equipment or material. An archaeological survey, a public education project and a planning document, are among the many types of projects that have been supported with the Historic Preservation Fund (Historic Preservation Incentives Programs).

For more information on Funding for the Historic Preservation Fund, click on the following link:
http://www.michigan.gov/mshda/0,1607,7-141-54317_18873-54145--,00.html

A preservation easement could provide forms of funding through tax incentives. According to the National Park Service, a preservation easement is a voluntary legal agreement that protects a significant historic, archaeological, or cultural resource. An easement provides assurance to the owner of a historic or cultural property that the property's intrinsic values will be preserved through future ownership.   By using this preservation tool, owners may receive significant tax benefits from the Federal government (Historic Preservation Tax Incentives).

When donating a preservation easement to a charitable or governmental organization, an owner may qualify to clam a charitable deduction on Federal income tax in accordance with rules set by the Internal Revenue Service (IRS).   Important estate and gift tax benefits as well as potential state and local tax benefits are also available to an easement donor. As outlined by the IRS, there are three requirements that must be met to qualify a donor for the Federal income tax deduction:

- An easement must be donated in perpetuity;
- It must be donated to a qualified organization; and
- It must be given "exclusively for conservation purposes."

Also, a property owner may combine an easement with Federal historic rehabilitation tax credits. This means that the owner conveying an easement on a historic building may also apply for a 20% tax credit under the Federal Historic Preservation Tax Incentives Program. This 20% tax credit applies to any project the Secretary of the Interior designates a certified rehabilitation of a certified historic structure. This credit is available for properties rehabilitated for commercial, industrial, agricultural, or rental residential purposes, but is not available for properties used exclusively as the owner's private residence. For more information about easements refer to the conservation easement tool section of this document (Historic Preservation Tax Incentives).

For more information on historic preservation tax incentives click on the following link to the National Park Service: http://www.nps.gov/hps/tps/tax/easement.htm

To find additional Federal and State historic preservation grants, tax incentives, tax credits, and local government programs, go to the Michigan State Housing Development Authority website and look up Historic Preservation Incentives Programs or click on the following link:
http://www.michigan.gov/mshda/0,1607,7-141-54317_18873---,00.html

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

Michigan's Local Historic Districts Act, Public Act (PA) 169 declares historic preservation to be a public purpose with the goals of safeguarding a community's heritage, stabilizing and improving property values, and fostering civic beauty for the education, welfare and pleasure of the citizens of Michigan. This is the state legislation that enables a community to adopt a local historic district ordinance. Under this act, any local unity of government such as a village, city, township, or county can adopt a historic district ordinance (The Local Historic District Ordinance).

The local historic district ordinance sets forth the administrative procedures that must be followed when establishing a local historic district. It also establishes the membership requirements and the duties and powers of the historic district commissions, the design review standards by which work in historic districts is reviewed, and a process for appealing historic district commission decisions. The local historic district ordinance is a land use regulatory tool similar to a zoning ordinance. It enables the community to say that resources in a specific, designated area are of such importance to the community overall that work in the district must meet established standards and guidelines.

A local unit of government must adopt a local historic district ordinance when it votes to establish a local historic district. However, it does not have to establish a local historic district in order to adopt a historic district ordinance. A historic district ordinance can be adopted at any time and adopting an ordinance does not require a community to create a local historic district. Should a threat to a historic district ever arise, having an ordinance in place would provide the legal foundation to invoke the protective powers given in PA 169 (The Local Historic District Ordinance).

For more information on Michigan's Local Historic Districts Act, click on the following link:
http://www.michigan.gov/documents/hal_mhc_shpo_LHDManual_07LocalOrdinance_161862_7.pdf

CASE STUDIES

Old Town Lansing, MI

Lansing is a Michigan Main Street Community and is exploring opportunities for the Old Town Lansing business district that could greatly impact its future and the character of its physical and economic environment. The Old Town Lansing Main Street Program is a proactive approach to redevelopment and revitalization for this Main Street Community and has developed an Executive Summary for the Old Town Lansing Market Study which was released in May of 2008.

Designed to capitalize on emerging opportunities in the marketplace as well as development to ensure the prosperity of Old Town Lansing, this document outlined information from the market study to establish the direction for current and future economic enhancement and redevelopment strategies. This executive summary provided information based on the market study for Marketing and Promotion Strategies, Housing Opportunities, Business Development, and Historic Preservation and Design that would best fit the needs for Old Town Lansing. The following information lists some of the results from this market study.(Downtown Professionals Network, 2008)

Marketing and Promotion Strategies

Market study analysis findings point to activities oriented to singles, couples at or nearing retirement age and families that:

- Celebrate Old Town's unique historic appeal
- Capitalize upon Old Town's distinct landmarks, assets and resources
- Emphasize the district's upscale "fun and funky" spirit
- Include hands-on activities and live entertainment for all ages
- Provide opportunities for the trade area's diverse groups to interact

The Festivals of the Sun and Moon, Farmer's Market and Old Town Art Market are examples of festivals and events that capitalize on these features.

Housing opportunities

Market Study findings indicate relatively high levels of interest in a variety of housing styles that could potentially be developed in the Old Town Lansing district and surrounding area. Interest expressed by consumer survey respondents, along with housing trends and projections through 2012, suggest a demand for at least 20 to 40 new Old Town area housing units of various styles.

Business Development

Examples of business types and merchandise lines showing potential for expansion and recruitment in the Old Town Lansing business district include:

- Food Services and Drinking Places
- Clothing and Clothing Accessories
- Food and Beverage Stores
- Furniture and Home Furnishings Stores

Historic Preservation and Design

Preserving Old Town's historic character, improving the district's aesthetics, and addressing building and other maintenance needs should be among the highest priorities pursued as part of this study's findings. Other historic preservation and design-related priorities cited in survey findings focus on aesthetic enhancements to the streetscape, ongoing maintenance needs, and efforts to improve connections between Old Town and the Greater Lansing Area.

One of the largest successes of this study can be seen when 10 small businesses in Old Town were awarded the IKEA "Small Business, Big Dreams" award and makeover in 2008. According to the Old Town Lansing Market Study these tools and incentives have been used effectively in the past to "incent" design review and approval processes, and have lead to the completion of "showcase projects" that set a high quality standard to be emulated by others(Downtown Professionals Network, 2008).

For a PDF version of the Executive Summary of Old Town Lansing Market Study and Strategies click on the following link:

http://www.iloveoldtown.org/images/uploads/OldTown_ExecSummary.pdf

Grand Ledge Opera House, MI

Originally a roller skating rink, built in 1880, the Grand Ledge Opera House was converted into its current form and opened in May of 1886. The Historical Society along with the Chamber of Commerce started the fund for restoration of the historic opera house and today the building remains well kept providing a great setting for weddings, receptions, and other large community gatherings and events. The main floor of this building is also blessed with an antique Barton Theater organ which was originally used in the Michigan Theater in Lansing and lovingly restored by the Lansing Theatre Organ Guild (Opera House, 2003-2010).

For more information on the history and restoration efforts of the Grand Ledge Area Historical Society, click on the following link:

http://www.gdledgehistsoc.org/community-opera.html

Beal Botanical Garden, East Lansing, MI

The Beal Botanical Garden was started by Professor William James Beal in 1873 consisting of 140 plots of grasses and clovers. By 1882 the garden displayed a rustic character, had grown to occupy about one third of an acre and included several hundred mainly native species established along the floodplain of a brook and in nearby shaded ponds and bogs. At its present, the garden occupies nearly six acres and includes more than 5,000 species organized in four main sections. It is an important educational element and a crucial piece of history at MSU (Historic Sites Online, 2009).

For more information on the James Beal Botanical Garden, click on the following link:

http://www.mcgi.state.mi.us/hso/hsmatchname.asp?hsn=Beal+Botanical+garden&hss=0

Olds Mansion, Lansing, MI

Olds Mansion, which was located in Lansing, Michigan, is an example of a crucial piece of history that was lost during the early 1970's, to freeway construction. All over Michigan, similar cases destroyed by the freeway system could have been saved by means of simple preservation efforts. It is through examples such as Olds Mansion that should be a constant reminder to the importance of historic preservation and its impact on our communities.
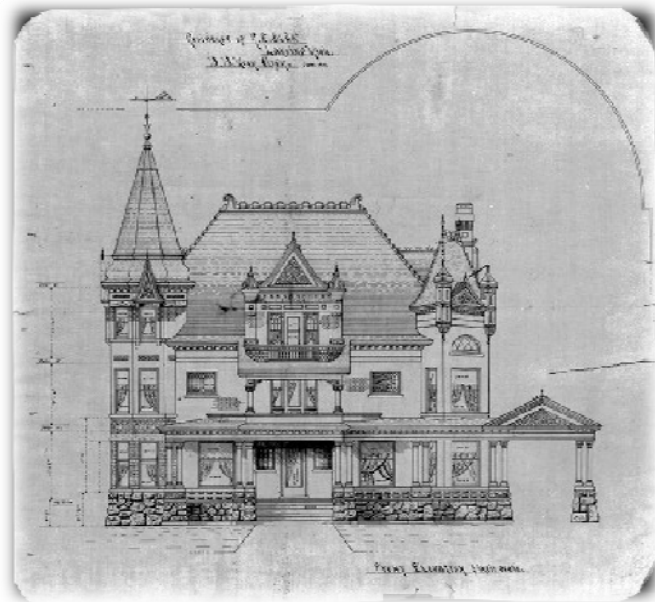
Ransom E. Olds, (the father of the Oldsmobile), and Metta Olds' house was completed in 1904 by Lansing architect Darius B. Moon. At the time, this Victorian Era house was one of the finest homes in Michigan, especially considering its historic significance. It was located in Lansing, at the corner of South Washington Avenue and Main Street and was within easy walking distance of the Oldsmobile plant and the soon-to-be-constructed Reo Motors plant. Ransom and Metta Olds' residence no longer stands because it was demolished in 1971 to make way for I-496, the highway that currently traverses

the City of Lansing. The Olds Mansion and the heart of Lansing's African-American community were torn out by the freeway's construction. When demolishing this building as well as the surrounding area, Michigan and the Lansing community lost a very important part of history as well as an area that would have great potential for economic return. This was a notable loss for Michigan and could have been countered by adopting a local historic preservation district (Olds Mansion, 2007).

The previous information was obtained from the Michigan Department of Natural Resources and Environment (DNRE) website and can be found at the following link: http://www.michigan.gov/dnr/0,1607,7-153-54463_19313_20652_19271_19357-159402--,00.html

DISCUSSION

Preserving historic buildings is essential to understanding our nation's heritage. In addition, it is an environmentally responsible practice. Existing buildings can often be energy efficient through their use of good ventilation, durable materials, and spatial relationships. An immediate advantage of older buildings is that a building already exists; therefore energy is not necessary to create new building materials and the infrastructure is already in place. Minor modifications can be made to adapt existing buildings to compatible new uses. Systems can be upgraded to meet modern building requirements and codes. This not only makes good economic sense, but preserves our legacy and is an inherently sustainable practice (Historic Preservation, 2010).

Some practical and/or intangible benefits of historic preservation include:

- Retention of history and authenticity
- Increased commercial value
- Retention of building materials
- Less construction and demolition debris
- Less hazardous material debris
- Less need for new materials
- Rehabilitation often costs less than new construction
- Reuse of infrastructure
- Energy savings

The previous information was obtained from the Whole Building Design Guide Historic Preservation Article found at the following link:
http://www.wbdg.org/design/historic_pres.php

According to a 2002 report on gentrification for Grand Rapids, MI, the process of property restoration, especially in low income neighborhoods, can sometimes lead to gentrification of the surrounding community. When a property is improved through preservation or restoration efforts, it often raises the surrounding property taxes. In doing so it may mean that lower income residents must move away due

to the rising housing costs. The difficulty comes when a neighborhood must pay attention to all of the consequences and plan for a mixed income neighborhood by maintaining low income housing options. Restoring historic property creates positive effects such as improving the city's tax base or appearance, but it may also lead to these negative effects of gentrification (Michigan State University: MSU Extension, 2002).

For more information about the Grand Rapids report on gentrification click on the following link: http://www.unitedgrowth.org/pdfs/reports/gentrification.pdf

BROWNFIELD RECLAMATION

BACKGROUND

The Environmental Protection Agency (EPA) defines Brownfield sites as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (EPA). Further defined by Part 201 of the Michigan Natural Resources and Environmental Protection Act 451, Brownfield's are any property with contamination above residential cleanup standards with redevelopment potential. (Michigan, Part 201) Many communities refer to these properties as "blighted" or "functionally obsolete." Brownfield sites adversely impact the environment whereas reclamation of these sites can recreate green space by restoring the existing site and capitalizing on existing infrastructure to promote sustainable development (Zwingle).

Reclamation of Brownfield sites can be both an economic and environmental process. The economic potential of the process will addresses the marketability of the site, the land use options, and the available financial incentives at the local, state and federal levels. The environmental process is driven by regulatory requirements that are designed to protect human health and the environment. Reclamation of a Brownfield site follow varying requirements depending on the mix of economic and environmental issues, history of the property, geographical location, and the current title status. (BRGM) Brownfield reclamation can strengthen and contribute to a green infrastructure vision.

(EPA)

When obtaining a Brownfield site for redevelopment, developers must understand what qualifies as a Brownfield site and what the reclamation process entails to avoid liability. The first step is to make sure the Brownfield site is qualified under Part 201 and Part 213 of the Michigan Natural Resources and Environmental Protection Act 451.   The sites are not list under Section 101 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Part 201 is the state's primary environmental cleanup statute. The 1995 amendments implemented reform to make the liability scheme more fair and created land-use based cleanup standards that dramatically reduced the cleanup costs. Key features of the 1995 amendments to Part 201 were:

- Created Baseline Environmental Assessment's to allow a new, innocent owner or operator of contaminated property to be protected from liability for existing contamination;
- Changed the liability scheme for existing owners and operators so that they are liable for the cost of cleanup only if they caused the contamination;
- Implemented cleanup criteria based on land use, eliminating the need for all sites to be cleaned up to the same degree and making industrial and commercial reuse of property more attractive and easier to accomplish; and
- Increasing flexibility for groundwater cleanup requirements, use of institutional controls and surface water protection.

The 1995 amendments also created "Due Care" requirements that apply to all owners and operators of contaminated property, regardless of liability. The "Due Care" provisions assure that the liability reform measures will not result in use of contaminated property in a way that endangers public health and safety. The "Due Care" provisions of Part 201 require that a person who knows their property is contaminated take steps to prevent exacerbation of existing contamination, mitigate unacceptable exposures that may result from the intended use of the property, and take reasonable precautions against harm to trespassers and from the actions of third parties. (NGA). For more information click on the link below:
http://www.nga.org/Files/pdf/MIBFIELDPROFILE.pdf

The second step is to determine the cleanup process. Michigan's cleanup law relies on risk-based clean up criteria which link the existing land use of the property to the future land use of the property. The process takes into account the existing conditions and provides procedures for cleanup based on the proposed land use. The cleanup process follows the criteria listed below:

- Environmental Site Assessment
- Baseline Environmental Assessment (for new developers)

The last step involves acquiring the necessary funding for the reclamation the site. The Brownfield reclamation process involves many different participants and stakeholders; below is a list of potential actors in the process and show possible agents in the reclamation process.

Local Agencies	Regional/ County	State	Federal	Private/ Non-Profit
Local Units of Government- Planning, Building, Zoning departments/boards	Planning, Building, and Zoning departments/ boards	DNRE Remediation and Redevelopment Division	Environmental Protection Agency	Real estate agents
Brownfield Redevelopment Authorities	Brownfield Redevelopment Authority	Michigan Economic Development Corporation (MEDC)	Housing & Urban Development- Community Development Block Grant	Developers/ Brownfield development companies
Local economic development corporations (EDCs), Downtown Development Authorities (DDAs), Local Development Finance Authorities (LDFAs)	County economic development corporations (EDCs)	Michigan Department of Labor and Economic Growth	Department of Agriculture- Rural Development	Business owners/ Corporations
Tax Increment Financing Authority	Health Department	Michigan State Housing Development Authority	Department of Commerce	Michigan Society of Planning
Building and Zoning Departments/ Fire and Police				Michigan Economic Developers Association

(Michigan)

For Further detail on cleanup standards and information click on the links below:

EPA Standards: http://www.epa.gov/brownfields/aai/aaicerclafs.pdf
Michigan Standards: http://www.michigan.gov/documents/deq/deq-rrd-bea-citizenguide_253033_7.pdf

METHODS OF IMPLEMENTATION

The role of local units of government and the community is important in the Brownfield reclamation process. One method can be to establish a GIS database that communities can use as a management tool, decision support, institutional control, and outreach tool for transforming Brownfield's into performing economic assets and to revitalize the economic and environmental health of our communities (ICMA website). For further information on how to develop a GIS database and implementation please refer to the flowing links:

http://www.brownfieldstsc.org/roadmap/cleanupdesign.cfm

http://icma.org/upload/library/2004-08/%7BE339F2D9-EA3D-4A25-BADC-1CDCBFC11001%7D.pdf

Additionally, outreach to the community surrounding each individual project requires developing an understanding of the community's perception of the site. Views of how the site might productively be used and how these factors relate to the community as a whole can ultimately benefit the surrounding areas (Brownfield Redevelopment Guidebook for MI). There are many zoning and planning techniques that can also be used as an implementation method such as:

Community-wide planning

> Allow citizens to actively develop an improvement strategy for their community by identifying a broad representative group of stakeholders. To establish Brownfield Redevelopment Authorities, which have the authority to develop and implement Brownfield redevelopment, and can qualify a developer for a credit against the single business tax for eligible investment.

Comprehensive Plans or Redevelopment Sub-Plans

> Vacant and underutilized properties require special planning to ensure redevelopment. Planning can be part of a comprehensive plan or a sub-plan. Sub-plans can be organized by topic or by sub-area/neighborhood.   Effective management of redevelopment will require that communities recognize the impediments that exist. Planning should begin with detailed data about the area or properties for redevelopment, including the specific problems facing each. Management practices should be selected to address the variety of implications that exist.

Local Land Use Regulations

> Zoning and subdivision regulations are local regulatory tools that can be used to encourage redevelopment. Within these broad tools, a number of specific techniques are available, including: Ensuring that densities, setbacks, design requirements and other development standards are appropriate to the areas in which redevelopment is planned. In the 1970's, communities often adopted suburban development standards for their entire jurisdiction, including areas of more traditional development. These types of examples can be found in many rural town ordinances that do not allow downtown buildings to be located near the street.

FUNDING

Michigan in the past five years has developed some of the most innovative financial tools in the nation to help both municipalities and developers redevelop properties defined as facilities. There are many ways to leverage and secure funds to support Brownfield redevelopment including: loans, grants, tax credits, tax increment financing, as well as training funds. Many incentives are available to encourage new development on Brownfield sites and they tend to spur the cleanup and revitalization of Brownfield properties (EPA).

The Tax Relief Act helps offset costs of certain environmental cleanup by targeting sites that may be fully deducted by eligible taxpayers in the year in which they are incurred, rather than having to be capitalized and spread over a period of years. This tax incentive is one of many federal initiatives to encourage business development and commercial economic revitalization. In general, a property is eligible for the tax incentive if it is at or on an area where there has been:

- A release or threat of release of a hazardous substance (including petroleum products).
- Disposal of a hazardous substance (including petroleum products).

If the property meets either of the above requirements, there are many types of costs incurred to redevelop a Brownfield sites:

- Site assessment and investigation;
- Site monitoring;
- Cleanup costs;
- Operation and maintenance costs;
- State voluntary cleanup program oversight fees; and
- Removal of demolition debris

However, the property must not be listed or proposed for listing on EPA's Superfund National Priorities List.

One of the most effective programs is the Brownfield Authorities under the Brownfield Redevelopment Financial Act; municipalities may establish a Brownfield Redevelopment Authorities (BRA) to facilitate local Brownfield field development.

- Leasing, purchasing and conveying property
- Accepting grants and donations of property, labor or other "things of value" from public and private sources
- Investing the authority money
- Acquiring property insurance
- Borrowing money
- Engaging in lending and mortgaging activities associated with property it acquires
- Establish and administer local site remediation involving funds to finance redevelopment activities
- Others.

Paying or reimbursing private and public parties for certain eligible activities including environmental cleanup and certain infrastructure improvements in qualified local governmental units.

For more information on how to create a Brownfield Redevelopment Authority, click on the link below:
http://www.themedc.org/Products-Services/Community-Assistance/Brownfields/Default.aspx

Tax Increment Financing can be used by a BRA to finance <u>eligible activities</u> on <u>eligible properties.</u>
For more details click on the link below:
http://ref.michiganadvantage.org/cm/attach/8A585A2D-23F5-4AED-B548-7D1F2210F44A/TaxIncrementFinancingAuthority.pdf

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

The Michigan Department of Natural resources and Environmental Protection Agency have entered a Superfund Memorandum of Agreement (SMOA). The SMOA establishes operating procedures for general coordination and communication between the Michigan Department of Natural Resources and the EPA Region 5 which help speed up and reduce duplication in responsibility which importance of facilitating the cleanup of sites. For further details click on the link below:
http://www.deq.state.mi.us/documents/deq-rrd-sf-sfmoa2.pdf

Below is a sample blight elimination ordinance from the Michigan Township Association. It serves as a guide for Michigan Township's to prevent, reduce, and eliminate blight or factors causing blight. For further details, please click on the link.
http://www.michigantownships.org/mta8963384.asp

CASE STUDIES

317 East Grand River, Old Town, Lansing MI

In summer of 2006 Lingg Brewer utilized the public incentive under obsolete property rehabilitation which allowed him to reclaim the underutilized facilities. The facilities were exclusively a retail store front with a vacant second story. He refurbished it into a true mixed use residential/retail building. Reclaiming this site improve the image of neighborhood and bringing back the sense of a place. It set a tone for future development as possibility for developer to look into and to reclaim these types of facilities.

For more information see the following link:
http://edc.lansingmi.gov/modules.php?name=Projects&id=6&pmenu_id=5&op=ProjectsDetails

Accident Fund's New World Headquarters, Lansing MI

Phoenix Development Partners, LLC, an affiliate of Christman Capital Development Company, is reclaiming the former Ottawa Power Station site into the national headquarters for the Accident Fund Insurance Company of America (Accident Fund). The headquarters will be comprised of the 219,000 square foot rehabilitated power plant and a new adjacent 105,000 square foot office building. As part of success of this reclamation major contribution from Public incentive such as Renaissance Zone, Brownfield Reimbursement, Brownfield and MEGA Tax Credits, Historic Tax Credits, EPA and DNRE Grant Funds. Reclaiming this site will help clean-up the contamination, influence the development patterns and long term economic sustainable by strengthen the urban core.

Jobs Retained - 632
Jobs Created - 500

For more information see the following link:

http://edc.lansingmi.gov/modules.php?name=Projects&id=6&pmenu_id=5&op=ProjectsDetails

Career Quest Office & Training Facility, 3215 S. Pennsylvania Ave. Lansing, MI

Public Incentive - Obsolete Property Redevelopment Act**,** Brownfield MBT Credit- $437,500

Development Company - 3215 S. Penn LLC (Allan Hooper)

Sector Description - Commercial Office Redevelopment

Project Description - The building, built in the 1960's, had been vacant for approximately 5 years, when in early 2008 local developer Alan Hooper decided to redevelop the property. The functionally obsolete 28,000 square foot building had suffered years of neglect and extensive water damage that had resulted in severe toxic mold conditions. After extensive remediation and months of construction the building emerged in late 2008 as a class A office facility and the new home of Career Quest, a career vocational center and staffing agency, with over 200 employees.

Project Cost - $1,500,000

Jobs Retained – 0, **Jobs Created –** 222, **Completion Date -** Fall 2008

For more information see the following link:
http://edc.lansingmi.gov/modules.php?name=Projects&id=6&pmenu_id=5&op=ProjectsDetails

DISCUSSION

Brownfield reclamation is vital step in Greening Mid-Michigan because it helps re-use land and can reduce Suburban sprawl by consuming less open space that is needed for the viability of our ecosystem. Reclamation supports and strengthens existing communities by the redevelopment projects in the inner city which stimulate the urban core economic activity. Below contains a list of contributions resulting from Brownfield reclamation:

- Sustainable redevelopment
- Restore property to productive use
- Increase property value
- Reduce pressure to develop Greenfields
- Increase local tax base
- Use existing infrastructure (cost savings)
- Mitigate public health and safety concerns
- Improve community image
  (Brownfield Redevelopment Guidebook for Michigan).

However, there are barriers and perceptions associated with Brownfield sites and reclamation. Vacant and underutilized facilities often remains because a number of impediments exist to redevelopment, including property or structure obsolescence, perceived or real environmental contamination, local land use regulations, lack of access to capital, and neighborhood opposition to proposed uses. (Encourage Economic Development Infill/Brownfield development).

INFILL DEVELOPMENT

BACKGROUND

Infill development fills gaps in existing communities and plays a critical role in achieving community revitalization, resource and land conservation that provides an alternative to sprawling development. Infill development conserves a community's financial resources by taking advantage of existing infrastructure, increasing walk-ability by contributing to safe and attractive pedestrian environments, and creates new opportunities for mixed-use neighborhoods that recapture the "sense of place" that is largely missing from development projects during the past 50 years (Models and Guidelines for Infill Development).

"Infill often refers to new development on vacant, bypassed, and underutilized land within built up areas of existing communities, where infrastructure is already in place. There are many reasons for Infill development approach it can contribute to a more compact form of development which reduces consumption of land and resources, which includes farmlands, wetlands and other critical sources." (Municipal Research Service Center).

FIGURE 19: PRINTERS ROW, LANSING, MI
HTTP://WWW.LANSINGCITYPULSE.COM/LANSING/ARTICLE-3754-EYE-CANDY_-OF-THE-WEEK.HTML

Modeling Guidelines for Infill Development:
http://www.mdp.state.md.us/PDF/OurProducts/Publications/ModelsGuidelines/InfillFinal_1.pdf

METHODS OF IMPLEMENTATION

Infill can be effective through a comprehensive plan that contains goals, objectives, and policies that address the location and intensity to guide future development and direction. The Municipal Research Service Center suggested that to encourage infill development projects, local governments should have strategies to make sites attractive for developers and the following strategies can be adopted.

Establish Focused Public Investment Areas

Local jurisdictions can set the stage for infill development by using a focused public investment strategy to direct growth to targeted infill areas within urban areas. Generally, these are areas where there is substantial existing development and the major public facilities are largely in place. Within these Focused Public Investment Areas (FPIA's), local governments will take a more proactive role in providing infrastructure and shaping growth. Below is an example how to set up a Public Investment Areas.
http://www.fhwa.dot.gov/tcsp/sgnwmidf.html

Adopt Infrastructure Strategies

This strategy is designed to attract development to an infill area by improving the gray infrastructure network and extending to the infill areas which support development. One of the attractions of an infill site is the general availability of existing infrastructure. However, as noted earlier, the site may lack some elements of basic infrastructure including direct road access to the site. In other cases, infrastructure may be underutilized by current standards or densities and may be deteriorated, requiring replacement particularly for a larger infill project. Under such circumstances, infill development becomes increasingly troublesome and expensive relative to "Greenfield" development; therefore resulting in urban sprawl.

For further more information about infill information and strategies click on the link below:
http://www.mrsc.org/publications/textfill.aspx#E19E1

FUNDING

Many infill development projects are funded through the assistance of county funds, tax increment financing, bond revenues, Community Development Block Grants and other sources. For more details on how each source can be applied, click on the links below:

U.S. Department of Housing and Urban Development: Community Development Block Grant Program:
http://www.hud.gov/offices/cpd/communitydevelopment/programs/

California Housing and Community Development: HCD's Loans, Grants and Enterprise Zone Programs:
http://www.hcd.ca.gov/fa/

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

The Infill and Redevelopment Code Handbook, produced by the Transportation and Growth Management Program of the Oregon Department of Transportation, and Oregon Department of Land Conservation and Development in Salem, Oregon. The handbook was completed in September of 1999 and provides an excellent set of samples and discussion for various techniques for infill development. This handbook can be very helpful in guidance and provides excellent examples for a starting point. http://www.oregon.gov/LCD/docs/publications/infilldevcode.pdf

Modeling Guidelines for Infill Development: http://www.mdp.state.md.us/PDF/OurProducts/Publications/ModelsGuidelines/InfillFinal_1.pdf

CASE STUDIES

Dane County, MI

A better Infill Urban Program that was accomplished in Dane County, Wisconsin. The program was funded to develop an infill development plan for Village of Black Earth; which illustrates the cooperation of different stakeholders and citizen participation to make the plan work. For more details on the plan click on the link below: http://www.countyofdane.com/plandev/community/build/pdf/2006/black_earth_BUILD_plan.pdf

Infill in the Marketplace: Alternatives to Sprawl

Infill in the Marketplace: Alternatives to Sprawl by Tom Sargent illustrates that communities can experience growth, have a vibrant sense of place and become economical viable. The question of where and how for growth takes place is the key. For details click on the link below: http://www.smartcommunities.ncat.org/articles/infillalt.shtml

Avondale Square, East Lansing, MI

The City worked with Mayberry Homes to design Avondale Square to strengthen the city's appeal to homeowners and provide opportunities for young families to live in East Lansing. Within walking distance of East Lansing Public elementary, middle and high schools, Avondale Square will offer:

- 16 new-owner occupied single family homes
- 14 three- and four-bedroom townhouse units
- two neighborhood pocket parks
- Redesigned streetscape with traffic calming and landscape features

This type of development encourages more compact development through the region. See the following link for more information:

http://www.cityofeastlansing.com/Home/Departments/PlanningDevelopment/CommunityEconomicDevelopment/AvondaleSquare/

DISCUSSION

Infill development helps utilize existing land and infrastructure which allows extra money to be use for investing in other public services to strengthen community. However, infill development may face opposition in some traditional communities. There are advantages of infill development include: that it helps protect and save farmland, wetlands, increase mobility by minimizing traffic congestion, and creates sustainability for future generations. However, there are few disadvantages associated with infill development. For example, the cost of development is more with infill and it often requires a large parcel of land. The following link provides comparisons of infill development versus suburban sprawl.

http://www.smartcommunities.ncat.org/articles/infillalt.shtml

URBAN AGRICULTURE / COMMUNITY GARDENING

BACKGROUND

Urban agriculture is a complex system encompassing a spectrum of interests, from a traditional core of activities associated with the production, processing, marketing, distribution, and consumption, to a multiplicity of other benefits and services. It includes recreation and leisure, economic vitality and business entrepreneurship, individual/community health and well-being, and landscape beautification. It also includes environmental restoration and remediation according to the Council on Agriculture, Science and Technology (CAST).

Furthermore, the American Gardening Association stated that Urban Agriculture improves people's quality of life by providing a catalyst for neighborhood and community development, stimulating social interaction, encouraging self-reliance, beautifying neighborhoods, producing nutritious food, reducing family food budgets, conserving resources and creating opportunities for recreation, exercising, therapy and education(American Community Garden Association). For more information click on the links below:
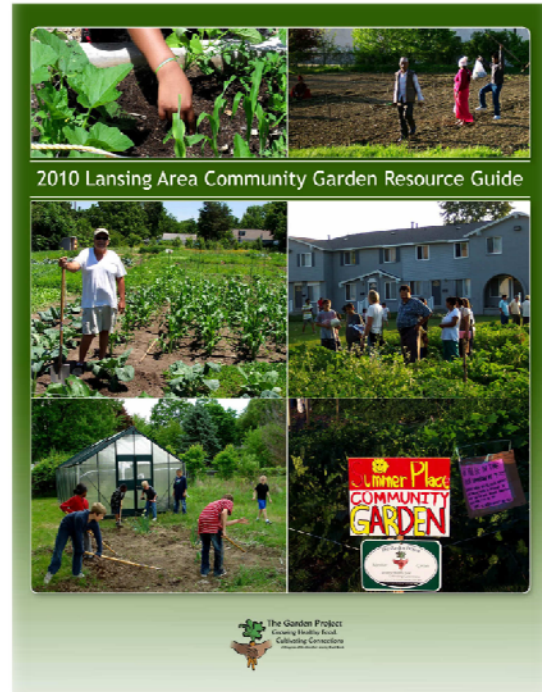
Urban Agriculture and Community Food Security in the United States:
http://www.foodsecurity.org/PrimerCFSCUAC.pdf

American Community Garden Association:
http://www.communitygarden.org/about-acga/

There are three broad categories of urban growers who contribute significantly to food security and raise the bulk of food involved in urban agriculture:

- Commercial farmers
- Community gardeners
- Backyard gardeners

Cities have other sources of unused land that have been put into food production by advocates of urban agriculture. For instance, food gardens and orchards have been developed on school properties and hospitals that once contained only landscaped plantings. Portions of city parks, utility right of ways and roof tops has been converted to productive space for growing food.

In an urban setting, community gardens are part of the open space network. The gardens and those who participate in community gardening contribute to the preservation of open space, provide access to it, and create sustainable uses of the space. Community gardens strengthen community bonds, provide food, and create recreational and therapeutic opportunities for a community. They can also promote environmental awareness and provide community education. (MRSC)

METHODS OF IMPLEMENTATION

Urban Agriculture farmers have few tenure rights over land and water and can easily be pushed out by land development. There are few steps and processes to make urban agricultures successful.

The first step is a city-wide food assessment; as advocates seek to address a range of interconnected food systems problems, many find that building partnerships and coordinating efforts is essential to developing effective and long-lasting solutions.

The second step is to form food policy councils; food policy councils are emerging in cities and states to coordinate policy initiatives, research, education, and events that build community food security. Individually weak stakeholders such as market gardeners can work with anti-hunger advocates, civic organizations, health agencies, and youth advocates around common issues.

This enables all groups to have input into plans that would increase food security. The suggestions below can serve as a guide for policymakers who seek to offer cities, especially their urban core, greater food security and the benefits of urban greening.

- Support infrastructure for increased urban food production, processing, and marketing
- Extend to urban growers appropriate farm-related services and opportunities
- Preserve farms on the urban fringe and support initiatives that convert idle and underused urban lands into production areas
- Promote and develop training in production
- Sponsor and publicize research which integrates health, nutrition, food production, access and economics together to solve whole city issues
- Educate professionals so that urban agriculture is automatically considered a part of urban and regional planning
- Realizing the Potential of Urban Agriculture

For more information, click on the link below:
http://www.foodsecurity.org/PrimerCFSCUAC.pdf

FUNDING

The USDA's Community Food Projects (CFP) Competitive Grants Program provides the major funding source for community-based food and agriculture projects nationwide. See the link below for more information:
http://www.csrees.usda.gov/funding/rfas/community_food.html

Funding preference is given to projects that develop linkages between two or more sectors of the food system, support the development of entrepreneurial projects, involve public and for-profit as well as nonprofit entities, and promote multi-system, interagency approaches with multi-stakeholder collaborations that build the long-term capacity of communities to address their food and agricultural problems.

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

The sample ordinance below is from Flint, Michigan. It serves as an example of how an outdated ordinance would provide challenges for regulation in urban agriculture. The following link provides a few specific zoning languages:
http://www.thelandbank.org/downloads/Urban_Food_Gardening_Report.pdf

CASE STUDIES

The Jolly Grove Community Garden, Lansing MI
The Jolly Grove Community Garden is a gathering space for community members to grow fresh food for their families and those in need. The garden will consist of individual plots, a communal donation garden, and a children's garden.

http://www.southlansing.org/LinkClick.aspx?fileticket=z4N8hQUNZzM%3D&tabid=817

Hunter Park, City of Lansing, MI

The park is 13 acres and is surrounded by single and multi family residencies. Uses include:

- Athletic Courts
- Water Pool/Playground
- Open Fields
- Picnic and Sheltered Areas
- Trail Network
- Community Garden

FIGURE 20: HUNTER PARK COMMUNITY GARDEN, LANSING, MI

As part of the city's five year park and recreation plan update, it was decided that Hunter Park should have its own master plan included in the document. Three organizations; Allen Neighborhood Association, Lansing Parks and Recreation Department, and Capital Consultants, Inc. helped to develop a plan based on input from community meetings. With the assistance of a Cool Cities Grant, additions (that were proposed in the master plan) to the park where implemented. A 100,000 dollar amount grant was issued by Cool Cites for the purpose of a community garden and a paved perimeter path and the renovation of their existing pool.

Highlights of the community garden include:

- **"**The project was completed May 10, 2008.
- The project has strengthened the old neighborhoods and also formed others. The Urban Gardener Certification project began in fall of 2008; there are garden mentors at the site about three times a year; Saturday workshops take place two to four times a month; and also there has been the Garden-in-a-box project, which has brought in forty-eight boxes.
- People in the area are able to grow their own food and also tend to the gardens.
- There has been a drastic increase in safety since people are at the park constantly. The music fest is held there; the park is used by a coalition of churches; and there are summer picnics, showers, and birthday parties" (Cool Cities, 2010).

For more information on the Hunter Park master plan update see the following link:
http://www.allenneighborhoodcenter.org/hunterpark.html
For more information on the Cool Cities grant program and other Michigan projects see the following link:
http://www.coolcities.com/main.html

DISCUSSION

There are many reasons Tri-County should encourage urban agriculture, it improves the quality of life and provides a catalyst for neighborhood and community development. It also stimulates social interaction. Urban agriculture helps encourage self-reliance, beautification of neighborhoods, the regeneration of urban natural areas, fostering healthy communities, and personal wellbeing.

However, urban agriculture projects can often be faced with many challenges such as:

- Land tenure
- Start-up costs
- Access to markets
- Knowledge and skills
- Seasonal limits
- Health
- Urban planning
- Vandalism and crime

In 1981, Michigan enacted a law titled the Michigan Right to Farm Act, P.A. 93, to help protect local farmers from many of these issues. This state statute authorizes the Michigan Commission of Agriculture to develop and adopt Generally Accepted Agriculture and Management Practices (GAAMPs) for farms and farm operations in Michigan.

The link below provides access to the Michigan Right to Farm Act:
http://www.legislature.mi.gov/%28S%28snc1ia45uh2k1j55bh3jrv3k%29%29/mileg.aspx?page=getobject&objectname=mcl-act-93-of-1981&queryid=8769063&highlight=

The link below provides access to the Generally Accepted Agriculture and Management Practices (GAAMPs):
http://www.michigan.gov/documents/mda/2010_Farm_Market_GAAMPs_-_Final_305018_7.pdf

Below are some links that can help give insight to urban agriculture and community gardening:
How to start a community garden:
http://celosangeles.ucdavis.edu/garden/articles/startup_guide.hml

Help write letters to in supporting of your community garden:
http://www.communitygarden.org/take-action/

Food security:
http://www.foodsecurity.org/resource_list.html#urbanag

RURAL AGRIBUSINESS

BACKGROUND

Rural Agribusiness is an industry engaged in the producing operations of a farm, the manufacture and distribution of farm equipment and supplies, and the processing, storage, and distribution of farm commodities (Webster). In the agri-food business, nearly $64 billion in total economic activity was contributed to Michigan and the industry employs 1 million people in 2008. (Koivisto) The agribusiness sector employs nearly 24% of Michigan's workforce which ranks as the second largest economic driver. Michigan is also the second most agriculturally diverse state in the United States with 10 million acres of farmland. Michigan leads the nation in the production of 19 commodities. Dairy is the leading segment of Michigan's agriculture industry contributing $5.1 billion of impact on the economy. In the Tri-County Region, the largest dairy cooperative in Michigan exists in Ovid containing the Michigan Milk Producers Association. It represents over 57% of the approximate 2,500 dairy farms in Michigan. Besides providing economic benefits, farms provide environmental benefits to communities as well. They provide stormwater catchment and flood control, wildlife habitat, and open space. They provide tax revenue sources for local governments since studies show farmers typically pay more in property taxes than they use for services.

To learn more about background information, please click on the following link:
http://www.michigan.gov/documents/mda/EconRepo_261313_7.pdf

METHODS OF IMPLEMENTATION

Michigan Food & Farming Systems (MIFFS) provides many great resources for farmers and consumers by promoting family farms, local food and sustainable agriculture. They have been advocates in establishing and developing more sustainable food and farming in Michigan through partnerships that result in healthy people and communities. To learn more about (MIFFS), please click on the following links.

The general website for MIFFS:
http://www.miffs.org/index.asp

Michigan Food & Farming Systems- MIFFS

Below is a tool section containing links to valuable resources for farmers interested in sustainable production, marketing, value chains, alternative energy and more:
http://www.miffs.org/tools.asp

Michigan Food & Farming Systems- resources for consumers

This site provides some resources for consumers looking for local food or more information about sustainable agriculture. :
http://www.miffs.org/consumers.asp

Michigan Food & Farming Systems- resources for farmers

This site provides resources for growers looking for helpful hints on marketing and selling products:
http://www.miffs.org/farmers.asp

FUNDING

Federal Programs

For those interested in becoming an agricultural producer, there are funding options available through the United States Department of Agriculture. The Rural Development sector of the USDA has programs in place such as the Value Added Producer Grants that stimulate value added agriculture ventures. These grants help establish a viable value added business venture and can fund working capital. Also in place is a Renewable Energy and Energy Efficiency Program where Rural Development offers grants and or guaranteed loans to help agriculture producers and rural small businesses purchase and install commercially available renewable energy systems in rural areas. Business and Industry Loan Guarantees provide financial backing for rural businesses including acquisition, start up, and expansion of rural businesses that create employment.

The Farm Service Agency of the USDA stabilize farm income, helping farmers conserve land and water resources by providing credit to new or disadvantaged farmers and ranchers. They have several programs in place to help farmers such as Farm Loan Programs that make direct and guaranteed farm ownership and operating loans to family size farmers and ranchers who cannot obtain commercial credit from a bank, farm credit system, or other lender. They also have a Conservation Program that is voluntary for agriculture landowners. Through the program, people can receive annual rental payments and cost share assistance to establish long term, resource conserving covers on eligible farmland. Price Support is another program to make loans to grain producers to build or upgrade farm storage and handling facilities.

State-Federal Partnership Program

FSMIP Grants are Federal State Marketing Improvement Programs that provide matching funds to state departments of agriculture and other state agencies for food and agricultural products and encourage new innovation and efficiency of the marketing system. www.Grants.gov allows organizations to electronically find and apply for over $400 billion in federal grants.

State of Michigan Agencies

Michigan Economic Development Corporation (MEDC) is a resource for businesses seeking growth. They provide site location assistance to job training grants as well as help with tax abatements. The Michigan Department of Labor and Economic Growth promotes energy efficiency and renewable energy resource development. They provide technical assistance, financial assistance, and demonstration projects. The Michigan Department of Agriculture (MDA) is a resource for connecting food and agriculture through collaborative promotion, research, and value added product development. They provide funding for growth and administer grants to promote the industry. The Michigan Department of Natural Resources and Environment can provide loan assistance at below market rates to local units of government for the construction of publicly owned wastewater collection and treatment facilities.

For a full list of the State of Michigan Federal and State Agriculture Departments Financial Assistance Programs available, click below for full details:
http://www.michigan.gov/mda/0,1607,7-125-1568_51684-202071--,00.html

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

There are many ways to promote rural agribusiness and farmland through the master plan process as well as farmland preservation programs. The Purchase of Development Rights tool in the toolkit provides sample ordinance language of farmland protection. Here is a sample ordinance of the Ingham County PDR Ordinance.
http://www.ingham.org/bc/BC/INDEX/2004/04-210.htm

CASE STUDIES

Ovid, Michigan

Michigan Milk Producers Association is the largest dairy cooperative in Michigan. It represents

1,430 of Michigan's 2,500 dairy farms. In 2007, Michigan dairy farms produced approximately 7.5 billion pounds of milk, and MMPA farms accounted for approximately 3.7 billion of those pounds. One of their processing facilities is located in Ovid which can process over 5 million pounds of milk daily. The plant maintains 96 jobs and created 166 indirect and induced jobs while

providing 344 construction workers jobs. The plant alone has provided $182.6 million in both direct and indirect economic impact.

Dolce Vita Goat Dairy- Greenbush Farms. St. Johns, MI

A local entrepreneur started an artisan cheese business and has been successful at promoting hospitality and food to communities.   They promote sustainable practices and provide local produce at farmer's markets in the Lansing area. The farm now produces three flavored chevres, a plain chevre and will be making feta cheese this year. Their savory roasted red pepper is very popular among customers and costs five dollars for a four ounce container or eighteen dollars per pound. To find out more information about this farm, please follow the link below. http://www.greenbush-farms.com/

AppleSchram Organic Orchard. Charlotte, MI

AppleSchram Orchard is a diverse farm of 15 acres of apple and pear trees, 10 acres of pasture ground and 5 acres of vegetables. They provide local organic food at farmers markets in the Lansing area. Here is a review of what people are saying about the produce from this farm. "Would love to visit the farm and hope to sometime soon! Our family has been fortunate to find that two local stores carry this best applesauce (Schram Organic). It rates way above any others that we've tried. Our grandchildren enjoy this applesauce on their whole grain pancakes and don't even need maple syrup when they see it is the Schram brand. Thank you for creating this great product and please continue making it available in the metro Detroit area."
To find out more information about this farm, please follow the link below. http://www.localharvest.org/farms/M14264

Sundance Riding Stable. Grand Ledge, MI

In Grand Ledge, a horse stable that is designed to attract horse enthusiasts has been successful with a 200 acre site. The site contains trails and meadows for riders and has an indoor riding arena that is 100' x 300'. The stable is aimed for those who like to ride horses or give options for people to board their horses. They also provide facilities for parties and are known for their Halloween haunted house and hayride. The stable also hosts many camps offering riding instruction, basic horse knowledge, trail riding and crafts. To find out more information, follow the link.
http://www.sundanceridingstables.com/

DISCUSSION

According to the Michigan Department of Agriculture in 2008, Michigan is still losing 30,000 acres of farmland per year. There have been farmland preservation programs in place to stifle farmland loss and have been somewhat successful. See the Purchase of Development Rights tool in the toolkit for more information on preserving farmland. (Koivisto) As the state's second largest economic driver and nearly 25% of the workforce, it is important to preserve open space systems and farming to maintain stability in the economy. As a large part of green infrastructure, farming provides the ability for farmers to maintain wildlife corridors and open space as well as serve as stormwater catchment/ flood control. Rural Agribusiness provides tax revenue sources for local governments since studies show farmers typically pay more in property taxes than they use for services. As the Great Plains and central California's water availability diminishes, Michigan water accessibility puts the state in great position nationally. The problem is if we can save enough of our farmland from sprawling development patterns that increase infrastructure costs and maintenance that often exceeds revenues for municipalities. In this time of being sustainable and green, it makes sense to preserve our open space and agricultural land to maintain a higher quality of life for residents as well as our ecosystem.

For more information about benefits of rural agribusiness please click on the following link:
http://www.michigan.gov/mda/0,1607,7-125-1572_28248-202601--,00.html

GREENING MID-MICHIGAN TOOLKIT: LINK TOOLS
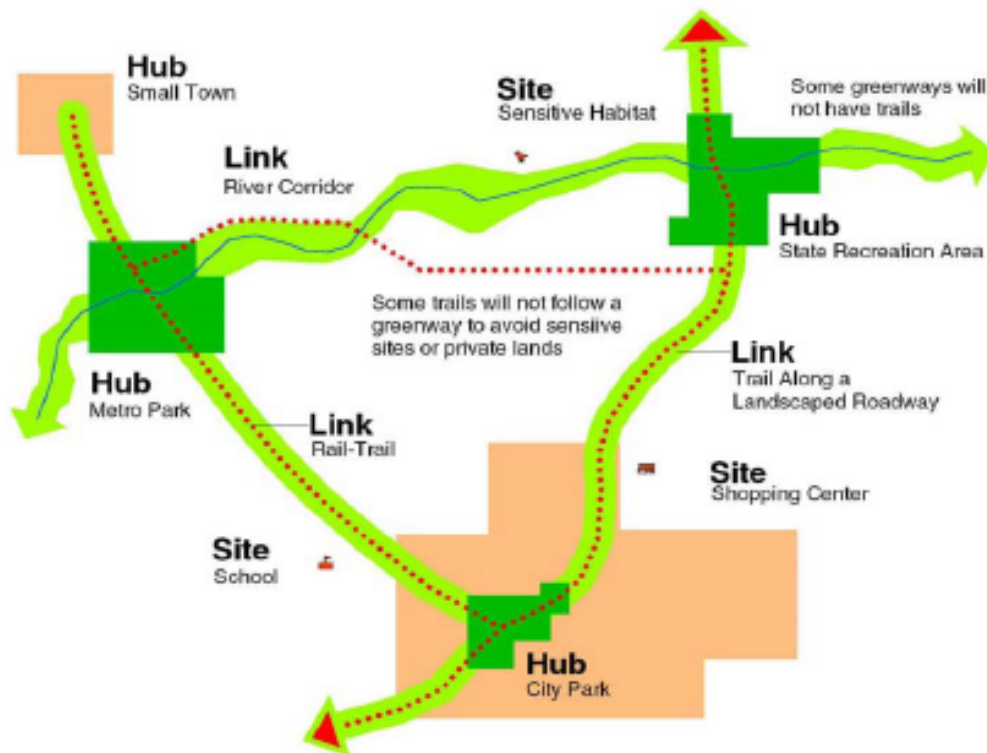
Links are corridors of trails and open spaces that link to hubs, while remaining as close as possible to sites of interest allowing pedestrian travel, animal movement and seed/pollen transfer between hubs and can consist of: Bicycle paths, Walkways, Jogging Paths, Wildlife Corridors, Hedge Rows between parcels, Riparian Buffers, etc.

TRAILS AND NON-MOTORIZED PATHWAYS

BACKGROUND

Trails and non-motorized pathways are major links that connect the hubs and sites in a green infrastructure network. Environmentally speaking, trails and non-motorized pathways provide essential connections for preserving "the health and biodiversity of wildlife populations" (Benedict M. A., 2006, p. 13) and by providing connections to parks, social institutions, town centers, historic districts, neighborhoods, economic zones, and transportation services. Trails and non-motorized pathways are developed and implemented through various planning efforts and are not limited to the examples contained throughout this section. Communities can assess the possibility of a trail and non-motorized pathway network based on their individual desires and resources available but should also strive for regional connectivity. The following are examples of various trail types that are found within urban and rural communities:

Rails-to-Trails

> Abandoned rail corridors are a very useful location because they offer a substantial foundation for a hard surface, and they often extend long distances, turning an eyesore into a functional community asset.
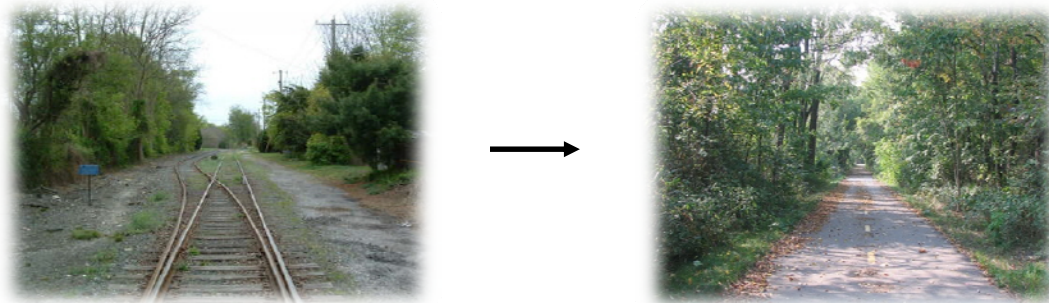
Bike Lanes and Paved Shoulders

> Designated lanes located on-street help ease congestion in high-volume pedestrian areas and promote other modes of transportation within an urban, suburban, and rural context. Roads that are unnecessarily wide or have excess lanes can be resealed and painted to include bike lanes.

Scenic/Nature Trails

Community members enjoy strips of land that are aesthetically pleasing and offer educational experiences. They may consist of hiking trails, multi-use trails including bicycle and equestrian uses, or water trails for canoes and kayaks. Rich biodiversity and/or prominent geographical features can be showcased in these areas, where appropriate.

River Trails

Located along waterways, river trails are becoming very popular in the Tri-County region. River trails range from paved trails to boardwalks to foot trails that allow community members access to various water features along with residential, commercial, social, and transit destinations.

Boardwalk

Boardwalks are constructed pathways typically found near beaches, wetlands, and over environmentally sensitive areas. This trail type is often associated with high pedestrian traffic located within or near commercial zones.

Water Routes

Michigan contains the highest number of lakes in America and there is potential to connect various water features throughout and between several regions. Water routes range from several thousand miles of connected lakes, rivers, and portages to downstream inflatable tube recreation opportunities. In all, recreation diversity is enhanced upon the development of water routes.

Safe-Routes-to-School Program

This program provides children a safe, alternative way going to and from area schools. Typically located in dense communities, Safe-Routes-to-School "will improve safety and reduce traffic, fuel consumption and air pollution in the vicinity of elementary schools."

http://www.saferoutesmichigan.org/about.htm

For specific examples and links of different trail types see "Appendix D"

To gather a sense of current trails and non-motorized pathways in the Tri-County region, Michigan Trails and Greenway Alliance, MTGA, offers a "trail finder" map tool, found on their website. This interactive map, interfaced with Google Earth, allows users to locate trails in their community and surrounding region. The same map identifies trail networks across the state. Oakland County and West Michigan are areas that contain extensive trail networks which can be learned from and are referenced throughout this section.

FIGURE 21 TRI-COUNTY TRAILS

FIGURE 22 WEST MICHIGAN
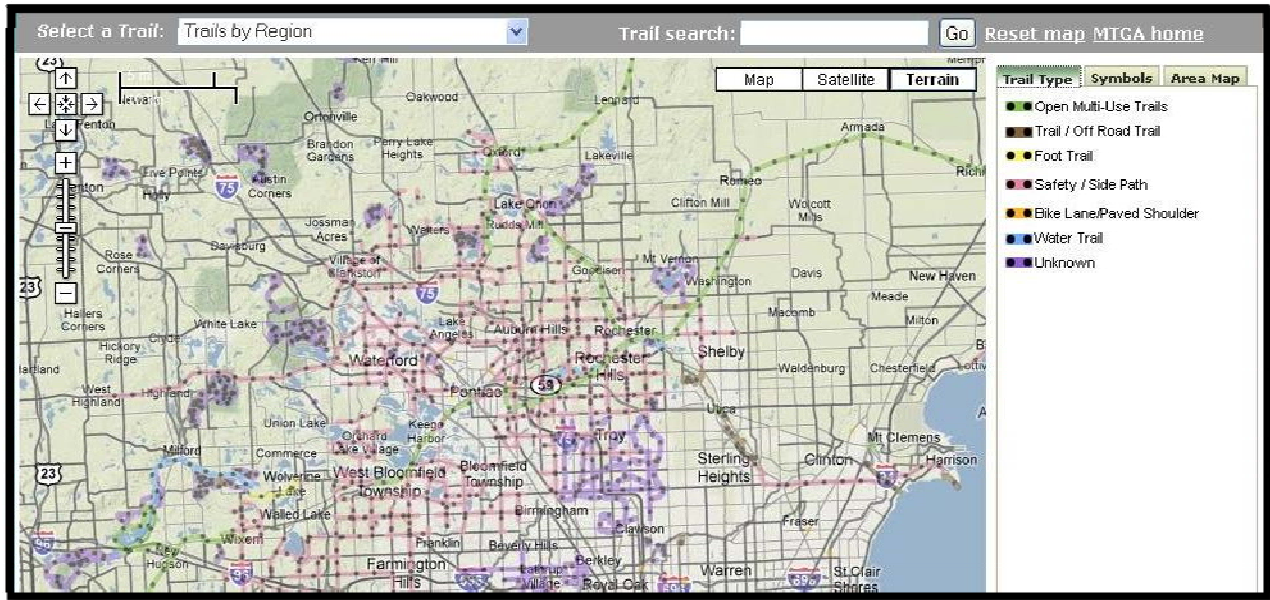
FIGURE 23 OAKLAND COUNTY

As trails and non-motorized pathways are developed and implemented to expand the green infrastructure network, local projects, completed and in progress, can provide insight to communities that are beginning to develop their own non-motorized transportation plan. Local governments in Tri-County have developed trails and continue to expand the network of links on a local scale as shown in the Meridian Township Park and Recreation Master Plan. As stated: "The highest priority for residents is the continued development of multipurpose trails or pathways in existing parks and pathways that link the parks together (pg 89). Other communities have marked this as a priority on their own master plans. A list of current and past projects in Michigan can be found at:

http://www.greenwaycollab.com/projects.htm.

This link includes overviews, planning documents, and contact information for each project. Four local projects are included;

- Lansing's non-motorized (in progress),
- East Lansing's non-motorized (in progress),
- Michigan State University Bicycle Facilities Plan (complete), and
- Meridian Townships Green Space Plan (complete).

The following three pages are maps of each represented county displaying a recommendation from the TCRPC for proposed trails and non-motorized pathways. For local jurisdictions; it is important to plan within your community but keep in mind the surrounding region and how connectivity can benefit everyone.

Clinton County
Proposed Non-Motorized Routes

NORTH

Non-Motorized Inventory

- - - Proposed Non-Motorized Route

0 1 2 4
Miles

Source: Local Jurisdictions, July, 2005
Tri-County Regional Planning Commission, 2008

Produced By: Tri-County Regional Planning Commission
February 5, 2008

This map was created for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.
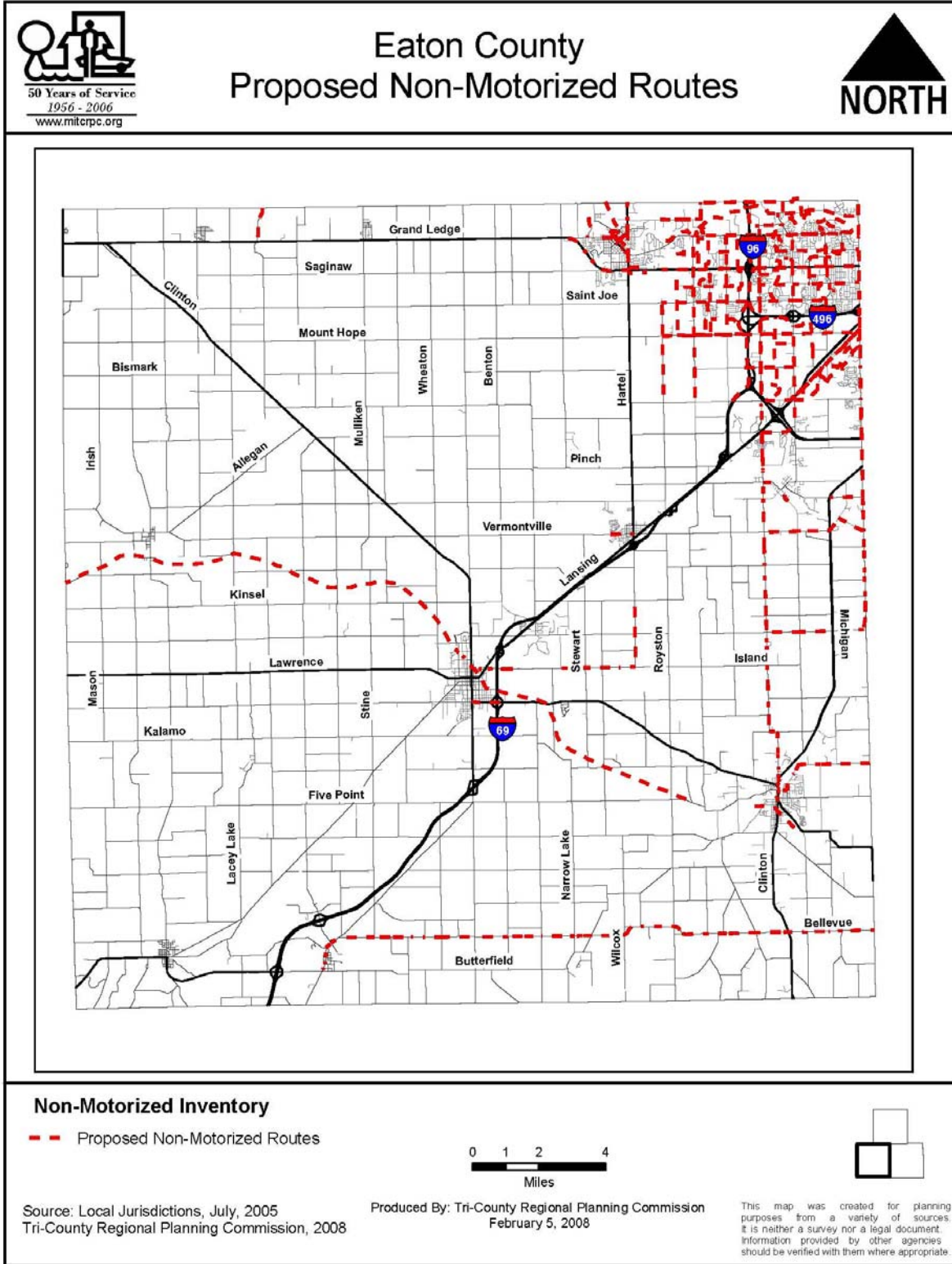
Ingham County
Proposed Non-Motorized Routes
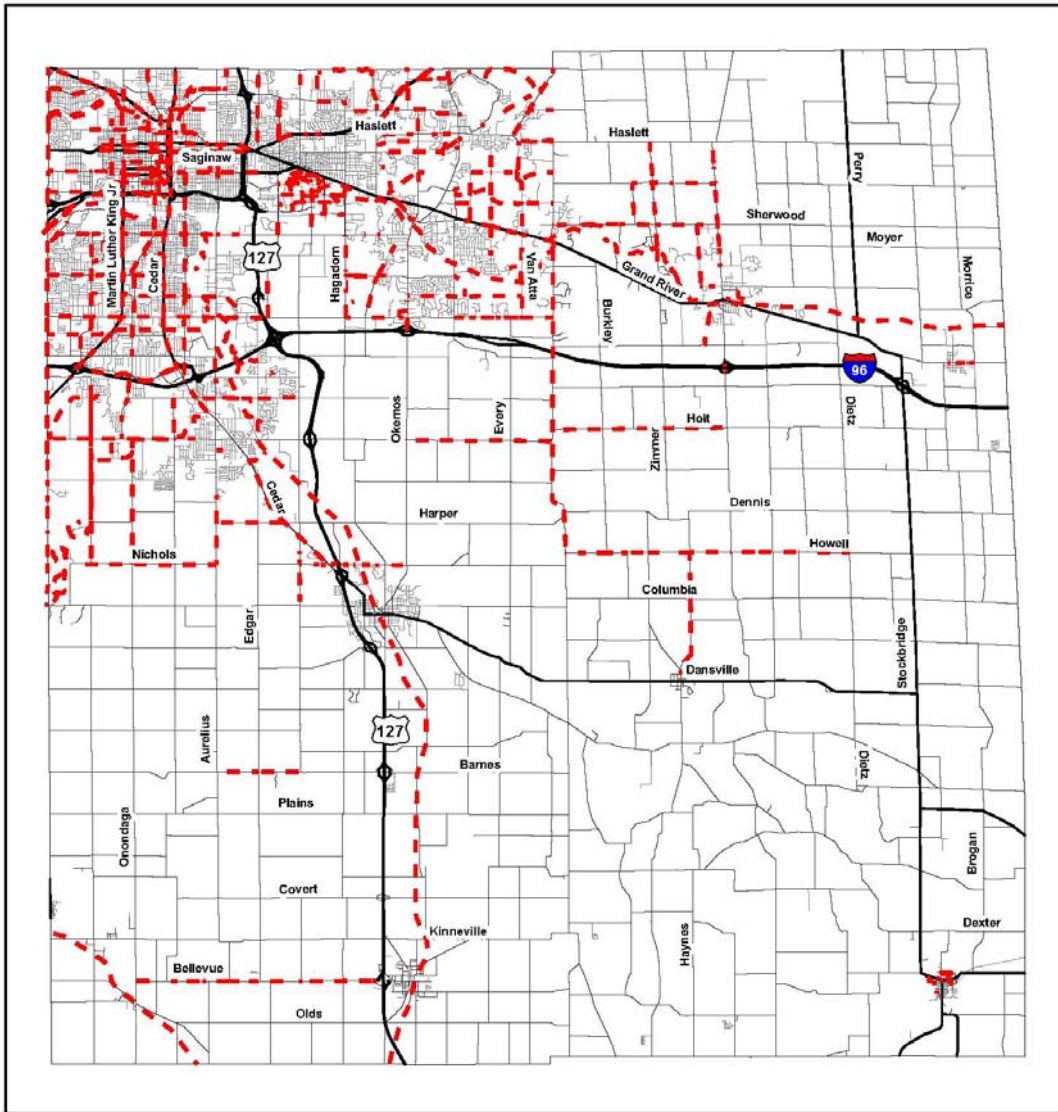
NORTH

Non-Motorized Inventory

- - - Proposed Non-Motorized Route

0 1 2 4
Miles

Source: Local Jurisdictions, July, 2005
Tri-County Regional Planning Commission, 2008

Produced By: Tri-County Regional Planning Commission
February 5, 2008

This map was created for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.

METHODS OF IMPLEMENTATION

Communities in the State of Michigan have adopted trails and non-motorized pathways in various planning documents. Often communities include it within a Parks and Recreation Master Plan. Other options are to develop:

- non-motorized transportation plans for county, township, city, or village,
- individual trail plans (including site-specific i.e. Boardwalks), and
- joint or regional partnership plans

The following will discuss a basic understanding of how to develop a plan for trails and non-motorized pathways. The section focuses on just one of the above options but can be applied to all.

Master Plan for Trails and Non-Motorized Pathways

      A document of guidance for local townships, charter townships, villages and cites.

      Updating or developing a Master Plan for Trails and Non-motorized pathways that stands alone is one option a community may take. This document would account for each of the following planning processes; developing goals and objectives, identifying existing trail networks, determining the best suitable route, and setting implementation guidelines and standards for development.

      Each county in the Tri-County region has the advantage of available inventories of land use and land cover provided through the TCRCP. Geographic Information Systems were used to capture the physical properties of each county and are an essential resource to incorporate into any planning document.

      Significant Natural Features in the Tri-County Region: Providing Ecological Information for a Green Infrastructure Plan

      The 2009 Potential Conservation Area Assessment Assesses conservation areas and suggests a "priority ranking system."

      The following are examples of different master plan concentrations that a community may approach.

Master Plan Type	Example/Link
County Level	Macomb County Trailways Master Plan http://www.macombcountymi.gov/mcped/Documents/Planning/Macomb%20County%20Trailways%20Master%20Plan.pdf
Township Level	Delhi Charter Township Non Motorized Transportation Plan http://www.delhitownship.com/forms/cd/NMTP.pdf Meridian Township Green Space Plan http://www.greenwaycollab.com/images/MTGP/MTG%20Low%20Res%20Final%20Greenspace%20Plan%20May%206%202004.pdf
City Level	East Lansing Non-Motorized Transportation Plan http://www.greenwaycollab.com/images/EastLansing/EL%20No%20Mo%20Plan%20Dec%201%202009%20Draft.pdf
Individual Trail	Clinton River Trail Master Plan http://www.greenwaycollab.com/images/CRTMP/Clinton%20River%20Trail%20Low%20Res%20Final%20Master%20Plan.pdf

Individual trails and non-motorized pathways that run through multiple jurisdictions commonly develop a specific master plan. A steering committee is formed by represented agencies to implement the plan.

Acquiring land

Acquiring land for a trail and non-motorized pathway can occur in various ways. Rails-to-Trails Conservancy, a non-profit trail advocacy organization, discusses possible techniques to acquire land and asks one general question; Will you be able to purchase or obtain an easement for the land that the trail will run thru?

- Purchase: Use funds to buy land directly from the current owner. Very simple but costly
- Option to Buy: Allows time for an organization to collect the necessary funds. A legal document is agreed upon by both sides and an up-front fee is applied to the purchaser.
- Easements: An affordable way to build a trail if the landowner is willing to allow the use on their property. This may or may not require a fee.
- Land Donations: The donator will benefit with tax incentives and the receiver will be able to develop the trail.
- Land Lease: The land will not be owned by the agency/organization but they will be able to use the land for a set period of time, for a nominal fee.
- Purchase and Lease Back: May apply in scenarios where the landowner is looking to sell their land but retain limited uses for a set period of time.
- Bargain Sale: Purchase land at less than retail price.
- Eminent Domain: Seize private land for the betterment of the community and providing just compensation to the land owner.

http://www.railstotrails.org/ourWork/trailBuilding/toolbox/informationSummaries/acquisition_methods.html

Outreach

It is important to reach out to the public and make them aware of developing and implementing trails and non-motorized pathways. Surveys and forums can encourage community members to participate in planning trails and non-motorized pathways. It is important to receive input from the public on how walkable they perceive their community to be. There are checklists available online for possible surveys.

Walkability Checklist 1: http://www.nhtsa.dot.gov/people/injury/pedbimot/ped/walk1.html
Walkability Checklist 2: http://drusilla.hsrc.unc.edu/cms/downloads/walkablity_checklist.pdf
Walkability Checklist 3: http://www.oakgov.com/peds/assets/docs/es_docs/tr_checklist2.pdf

Healthy Community Toolkit

The mission of this toolkit is to "Create a heart-healthy and stroke-free Michigan by increasing physical activity and healthy eating, reducing health disparities, and preventing and controlling other cardiovascular disease risk factors." Categories that are discussed and evaluated are; Community Design and Public Health, Land Use Planning, Community Participation methods, and others.
Link: http://www.michigan.gov/documents/HealthyCommunitiesToolKit_Web_168570_7.pdf

Appendix G contains an outlined version of Macomb County Trails Master Plan. The outlined version can provide a starting point and guideline for any community interested in creating their own plan.

FUNDING

After a plan and regional guidelines are established for trails and non-motorized pathways the next step in implementation is securing funds. (Some State Level Grant Programs require a community to have an adopted Master Plan). This can be achieved many different ways depending on the community's vision and resources. Below are some potential options for funding sources for trails:

Federal Assistance Programs

Rivers, Trails, and Conservation Assistance (RTCA)

Administered by the National Parks Service this program will provide technical assistance to a state or local agency, tribe, non-profit organization, or citizens' group. Applications are to be made brief (3 pages) and follow certain criteria such as; defined goals, stakeholders, and RTCA's role in the project, protection or improvement of wildlife areas or recreation opportunities, and evidence of community support. If granted assistance the RTCA will send a representative that is familiar with the implementation of conservation projects to help guide the agency.
Application Deadline: August 1st
Assistance: Will be granted the following fiscal year for one year with a possible year renewal.
Website: http://www.nps.gov/ncrc/programs/rtca/contactus/cu_apply.html

State Funding

Michigan Transportation Fund (Act 51)

"Section 10k of Act 51 requires each recipient of Act 51 dollars to spend at least one percent (1%) of those dollars on bicycle and shared-use transportation facilities." (Lansing DDA, 2005)

- Sidewalks are eligible expenditures
- Available for County Road Commissions, cities, and villages

The Michigan Natural Resources Trust Fund (MNRTF)

Administered by the Department of Natural Resources (DNR) this grant program will assist local governments in acquiring land of significant environmental importance or recreation potential lands and in development of recreation facilities. Certain criteria must be met before any funds (ranging from $15,000 – 500,000) are distributed and can be found here; http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-124961--,00.html

Transportation Enhancement Program (TE)

Administered by the Michigan Department of Transportation (MDOT) this grant program offers funds to trails and non-motorized systems that follow these criteria;

- Connect and develop documented regional or statewide trail systems
- are appropriate for the need and user types targeted
- benefit state tourism or economic development initiatives
- if locally significant, have strong transportation connection and involve planning efforts or serve as connectors to regional trails
- are a priority on MDOT, county or regional trail plans
- address documented safety deficiencies
- are part of a broader non-TE funded non-motorized system

Recreation Improvement Fund (RIF)

Administered by the Department of Natural Resources and Environment this grant program specifically targets recreational trails and the operations, maintenance, and development associated with them. These funds are targeted towards state owned land or trails of statewide significance in the overall interconnected statewide system. There is no limit on the dollar amount for individual projects. For more information on how to apply visit this site; http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985-125046--,00.html

Land and Water Conservation Fund (LWCF)

The link provided below takes you to a resource book presented by the MDNR. It contains basic information and guidance when applying for this grant:

http://www.michigan.gov/documents/IC5600LWCFAPPLICATIONGUIDELINES_156988_7.pdf

Local Funding

Capital Improvement

The following is from America Planning Association EDA Online Toolbox: The capital improvement program (CIP) — a five — to six-year schedule of capital improvement projects — is one of local government's most powerful tools for implementing a local comprehensive plan

and supporting both commercial/industrial and residential growth. By carefully selecting and timing capital projects, the CIP process can ensure that a local government:

- Repairs and replaces existing infrastructure;
- Meets needs in mature, growing, and redeveloping areas;
- Coordinates activities or various government department; and
- Ultimately influences the pace and quality of development in a community.

"The CIP document itself consists of project descriptions along with schedules and tables showing revenue sources and expenditures by year. Capital improvements include major nonrecurring expenditures for such projects as civic centers, libraries, museums, fire and police stations, parks, playgrounds, street construction or reconstruction, sewage and water treatment plants, water and sewer lines, and swimming pools. Costs associated with capital improvement projects include architectural and engineering fees, feasibility studies, land appraisal and acquisition, and construction." (APA, American Planning Association, 2008)

Michigan Trails and Greenway Alliance (MTGA) provides a detailed composition for funding a trail project:
http://library.michigantrails.org/funding/michigan-bike-and-pedestrian-funding-opportunities/

Another good resource is the National Trails Training Partnership website. Included under their "Resource" tab are articles, documents, and announcements of current, related funding options such as "grant programs", "grant writing", "funding ideas", and "volunteers & youth."
http://www.americantrails.org/resources/funding/index.html

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

Township Level
The following link contains a sample ordinance from Delhi Township, Michigan:
http://www.delhitownship.com/Legal%20Notices/Ord_117.pdf

City Level
The following link contains a sample ordinance from Lansing, Michigan:
http://www.walkbikelansing.com/

1. "Requires the City of Lansing to adopt a Non- Motorized Network Plan.
2. The Non-Motorized Network Plan would include, at a minimum, accommodations for accessibility, sidewalks, curb ramps and cuts, trails and pathways, signage, and bike lanes, and shall incorporate the principles of Complete Streets and maximize walkable and bikeable streets within the City.
3. To the extent financially feasible, future construction or reconstruction of City rights-of- way or any parts thereof shall be in conformity with the Non-Motorized Network Plan.
4. Encourage adequate funding for the plan.

5. Require an update of the Non-Motorized Network Plan every five years from the date of adoption."

   Source: http://www.m-bike.org/blog/2009/08/18/lansing-approves-complete-streets-ordinance

Legal Documents

The following document refers to various common law, liability, signage and other amendments and statutes related to trails and non-motorized pathways in the State of Michigan.

Michigan "Trail" Statutes; a report composed by a "Lawyer for corridor owners, buyers, trails groups, government agencies, and various railroad entities" (pg 1).

Legal Statutes for Michigan: Michigan Corridor Liability and Legal Issues in 2008; Geoffrey L. Gillis

http://www.co.genesee.mi.us/gcmpc-plan/Files/Docs/Trails/summit%20presentations/Trail%20Liability.pdf

CASE STUDIES

County Trails and Non-Motorized Pathways Master Plan

Macomb County Trailways Master Plan, MI

The purpose of the Macomb County Trailways Master Plan is "to capture the momentum of existing trail projects and work closely with local, regional, and state agencies to develop a plan that presents a unified and coordinated vision for non-motorized transportation planning and development in Macomb County." (pg 5) Five sections are included in this document and include; Purpose & Process, Existing Systems, Preferred Corridors, Design Considerations, and Implementation Strategy. This case study will outline the content of each section. See Appendix G for detailed outline of the entire Master Plan.

The following link has more information regarding this plan:
http://www.macombcountymi.gov/MCPED/Documents/Planning/Macomb%20County%20Trailways%20Master%20Plan.pdf

Individual Trails and Non-Motorized Pathways Master Plan(s)

Hayhoe Riverwalk Trail, City of Mason, MI

Hayhoe Riverwalk Trail is a 1.5 mile trail in the City of Mason, MI. The trail extends from Howell Rd., through the city, and ends at Kipp Rd. The trail was completed with a purchase of an easement from the Riverwalk Meadows Homeowners Association (RMHA) in 2007. Various sites are connected to the trail including neighborhoods, a cemetery, and other recreation areas. There are plans to expand the trail to surrounding area. In 2009, the Ingham County Parks and Recreation Commission gave their support to link the trail to Rayner County Park (as of 4-18-10 the park is closed).

http://www.mason.mi.us/parks.htm

Clinton River Trail, Oakland County MI

The Clinton River Trail is a recreational multi-use trail on 16 miles of abandoned rail line through the heart of Oakland County. The friends on Clinton River Trails group formed after a railroad discontinued usage and the group became the catalyst for acquiring the land of the abandoned tracks. This movement of advocacy led to the formation of a Master Plan for the purpose of coordinating a seamless connection through five communities. The project received funding from the MNRTF and the GreenWays Initiative (Community Foundation for Southeast MI) which contributed to the overall fund. Land acquisition was possible by the contribution of local governments that the trail runs thru and the actual development was supported by MDOT.

Challenge: Proposed trail runs through five communities, through different zone (business, school, housing, and unknown natural areas), and would cross high-speed traffic intersections.

http://www.greenwaycollab.com/images/CRTMP/Clinton%20River%20Trail%20Low%20Res%20Final%20Master%20Plan.pdf

DISCUSSION

Human health, environmental, economic, and social benefits all relate to trails and non-motorized pathways. There are also concerns within communities that trails and non-motorized pathways promote criminal activity around and/or near them but empirical research has dismissed this.

Health Benefits: Physical, Psychological, and Spiritual

As of 2008 Michigan obesity rates are near the highest in the nation. 71% of males and 54% of females are considered obese (Kaiser Health News, 2008). By providing other modes of transportation and various recreational opportunities, trails and non-motorized pathways can vastly improve health conditions such as weight, blood pressure, diabetes, heart, depression, anxiety, arthritis, and osteoporosis (CDC, Centers for Disease Control and Prevention, 2009). Psychological enhancement is achieved by allowing trail users to determine how they will use the trail (i.e. skating, biking, and running), building relationships with other users, and having a personal stake in the trail by stewardship(Nelson, 2008). Spiritually trails can connect people with themselves and their surroundings as presented in the Bible and transcendentalism literature.

"Every $1 investment in trails for physical activity led to $2.94 in direct medical benefits." (Wang, 2004)

For more health benefits see: http://www.americantrails.org/resources/devel/index.html
Under "Health & Fitness" tab

Environmental Benefits: Conserve, Connect, and Create

Trails and non-motorized pathways protect migratory patterns and sensitive habitat areas while reducing energy usage (Nelson, 2008). They have the ability to connect; animals and organisms to natural habitats and people to the environment, if planned accordingly. Trails and non-motorized pathways create opportunities for; native plants to flourish, people to physically engage with nature, and create a greater image for the community.

Economic Benefits: Increased property value and Business Opportunities
Trails and non-motorized pathways open opportunities for, property owners to improve capital, local business to attract a larger array of consumers, and communities to attract visitors. Trails have also proven to provide direct and indirect spending in communities (Nelson, 2008).

For more Economic Benefits see:
http://library.michigantrails.org/index/ Under "Trail Benefits" tab

Social Benefits: Recreation, Aesthetic, Diversity, and Knowledge
Trails and non-motorized pathways tie communities together the same way they tie green infrastructure together; "trails are a link, not a barrier compared to some infrastructure" (Nelson, 2008). Trails are used to connect hubs and sites and they also are used to connect people and communities. Pictured to the left is Granger Meadows Park, Dewitt Township, MI. Trails throughout this park connect community buildings, playgrounds, athletic fields/courts, picnic areas, a sledding hill, a roller rink, a disc golf course, and parking.

Safety Concerns: "The research that has been conducted, along with anecdotal evidence, suggests that converting an abandoned rail corridor to a trail actually tends to reduce crime by cleaning up the landscape and attracting people who use the trail for recreation and transportation." (Morris, 1998)

WILDLIFE CORRIDORS

BACKGROUND

Wildlife corridors are narrow strips of land that connect isolated patches of wild habitat, such as nature reserves, often trapped in seas of human developments such as farms and subdivisions. Many experts say corridors benefit biodiversity by allowing plants and wildlife access to a wider range of resources. For example, when food and water are scarce in one patch of habitat, they may be abundant in another. Without a corridor connecting the patches, some species would be unable to reach necessary resources (Roach, 2006).

Wildlife corridors are particularly beneficial along riparian corridors, where they provide both aquatic and terrestrial connectivity. In urban areas, they can provide significant recreational opportunities and important linkages in a highly fragmented landscape. Whenever possible, urban and rural parks and open spaces should be linked to form functional wildlife corridors, which can then be joined to outlying core reserves (Wildlife Corridors).
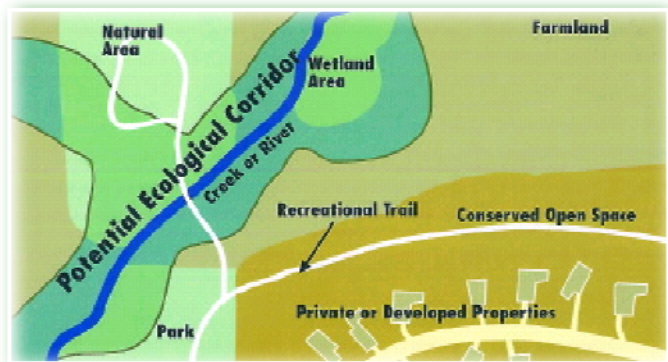
It is important to also consider wildlife corridors as habitat for smaller animals. Since the Tri-County lacks many large animals such as bears and Elk, these smaller animals will benefit most from the reserves. The most effective corridors are those that contain resident, reproducing wildlife populations of diverse species (Smith & Hellmund, 1993).

METHODS OF IMPLEMENTATION

Wildlife corridors naturally fit into a larger green infrastructure plan. Many projects have actually begun as recreational trail systems that evolve into a more ecologically valued system (Benedict & McMahon, 2006). Wildlife corridors may also split duty as regional parks and other recreational opportunities. Because of this dual purpose, a greater number of implementation methods exist.

Communities should begin by identifying hubs of wildlife activity with the highest level of biodiversity as well as migration patterns of wildlife between these areas. Much of this data is already available in a report completed in 2009 by the Michigan Natural Feature Inventory for the Tri-County Regional Planning Commission. This report includes detailed maps and inventories of land cover including:

- Land use history and change;
- Rare plant diversity;
- Rare Terrestrial Animals; and
- Rare aquatic animals.

Criteria for Wildlife Corridors according to the United States Department of Agriculture Natural Resources Conservation Service are (USDA Natural Resource Conservation Service, 2009):

- Continuity –Corridors must be uninterrupted strips (i.e., no roads, vegetative or physical barriers, etc.) connecting two or more patches of suitable habitat. Wildlife friendly fencing is not considered a barrier. Suitable habitat may consist of grasslands, rangelands, forests, wetlands, shrubby areas, or natural substrates suitable for use by wildlife species adapted to the landscape and site conditions and conforming to the composition and quality criteria below.

- Composition - Corridor vegetation must be suited to natural site conditions, consistent with the larger natural landscape context, and appropriate for the kinds of wildlife present, hence native vegetation is highly preferred.

- Quality – Invasive exotic vegetation must be controlled.

- Dimension –The average width must be ≥ 30 feet with no section < 20 feet wide. Since context is so important no one size fits all conditions, however wider corridors are better and irregular boundaries (or borders) are preferred over straight.

For more information on wildlife corridor basics, see the follow link:
http://www.nrcs.usda.gov/new_csp/animal_pdfs/ANM19_Wildlife_Corridors.pdf

FUNDING

- Federal Highway Administration's "Hazard Elimination Program"
  - http://safety.fhwa.dot.gov/hsip/policy_guide/memo021500.cfm#attach
- Michigan DNRE Grants:
  - Nongame Wildlife Fund Grants
  - Land and Water Conservation Fund
  - Michigan Natural Resources Trust Fund
- Local general fund
- Capital Improvement Programs
- Private monetary and land donations
- John Ball Zoo Society Wildlife Conservation Fund
  http://www.johnballzoosociety.org/conservation.php

See the following link for more information on State of Michigan grant programs:

http://www.michigan.gov/dnr/0,1607,7-153-10366_37984_37985---,00.html

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

Because of the varied nature and length of potential wildlife corridors, several regulatory considerations may be use but not all will be applicable in certain segments of the corridor.

Wildlife Corridor Master Plan

A master plan to design, maintain, and restore native vegetation within a wildlife corridor is essential (Smith & Hellmund, 1993). Emphasis should be put on habitats used by the most sensitive species. A list of threatened and endangered species in the Tri-County region may be found in the MNFI report on the Greening Mid-Michigan website. Controlling invasive weedy species, especially exotics, is also necessary.

Zoning considerations

Restricting development of parcels adjacent to the corridors may also be beneficial. Lower densities and landscaping sections that require appropriate buffer zones that protect sensitive vegetation and animal species is important to maintain biodiversity.

Parks and Recreation Plans

Since sections of wildlife corridors may also be used for parks and recreation, the local or regional recreational master plan should coincide with the overall wildlife corridor master plan. It is also critical to control access and divert trails away from sections of the corridor where organisms that are sensitive to human disturbances are located.

Conservation Easements

Conservation easements allow private landowners to voluntarily limit the ability to develop their property, thereby permanently protecting its open space values. The easement does not require public access on the property, unless that is the specific wish of the landowner and/or community. The types of land that can be protected by a conservation easement include any land whose conservation is in the public interest such as, woodland, wetlands, wild and scenic rivers, and undisturbed natural areas. The easement, once donated to the State of Michigan, is held in perpetuity and cannot be sold or transferred to another entity and is a flexible approach to permanently protecting natural lands while keeping them in private ownership.

CASE STUDIES

Meridian Township Greenspace Plan

  Meridian Township's Greenspace Plan completed in 2004 identifies the location of priority conservation corridors intersections with road crossings. It also identifies methods that have been proven to reduce crashes between vehicles and deer by 78-90% such as fences, reflectors, and underpasses.

  For more information on Meridian Township's wildlife corridor plan, see the following link. Refer to pages 31-37:

  http://www.greenwaycollab.com/images/MTGP/MTG%20Low%20Res%20Final%20Greenspace%20Plan%20May%206%202004.pdf

United States Department of Agriculture State Acres for Wildlife Enhancement (SAFE) Program

  SAFE allows producers to install practices that benefit high priority state wildlife conservation objectives through the use of targeted restoration of vital habitat. The goal of SAFE is to create 7,500 acres of diverse grasslands in 18 southern Michigan counties including Clinton, Eaton, and Ingham counties. The 18 south Michigan counties eligible for SAFE were chosen because they once contained most of the state's native grasslands. Landowners who choose to participate in the practice may receive 90 percent of the cost of converting the land into wildlife habitat.

  For more information on the USDA SAFE program, see the following link:

  http://www.fsa.usda.gov/FSA/newsReleases?mystate=mi&area=stnewsroom&subject=stnr&topic=landing&newstype=stnewsrel&type=detail&item=stnr_mi_20080729_rel_003.html

Detroit River International Wildlife Refuge

  On December 21, 2001, President Bush signed legislation establishing the first International Wildlife Refuge in North America. The refuge, which includes islands, coastal wetlands, marshes, shoals, and riverfront lands along 48 miles of the Detroit River and western Lake Erie, will protect and restore habitat for 29 species of waterfowl, 65 kinds of fish, and 300 species of migratory birds in Michigan and Ontario, Canada.

  The Detroit River International Wildlife Refuge has received national acclaim for its use of public-private partnerships in building this urban refuge. In the first five years, the refuge has grown from 304 acres to 4,982 acres. The refuge is managed by staff at the refuge office in Grosse Ile, Michigan.

  For more information on the Detroit River International Wildlife Refuge, see the follow link:
  http://www.fws.gov/refuges/profiles/index.cfm?id=31521

DISCUSSION

It cannot be assumed that a particular greenway will be unequivocally good for nature biodiversity (Smith & Hellmund, 1993). Habitats represented in the greenway will meet the living and dispersal requirements of some species but not of others. In some cases, species that benefit from the greenway may be opportunistic or weedy species that prosper at the expense of more sensitive species. Corridor design must be assessed relative to those more sensitive species.

There are two large impediments to creating large-scale corridors in the Tri-County region. These are inadequately identifying threatened organisms in the region and mid-Michigan's highly fragmented landscape. The vast majority of the landscape has been altered by humans either for the growth of cities or for large scale agriculture. These actions have devastated wildlife habitat over the years. This makes redeveloping wildlife corridors significantly costlier and more complex than it would have been to protect the corridors from the beginning.

GREENING MID-MICHIGAN TOOLKIT: MANAGEMENT TOOLS
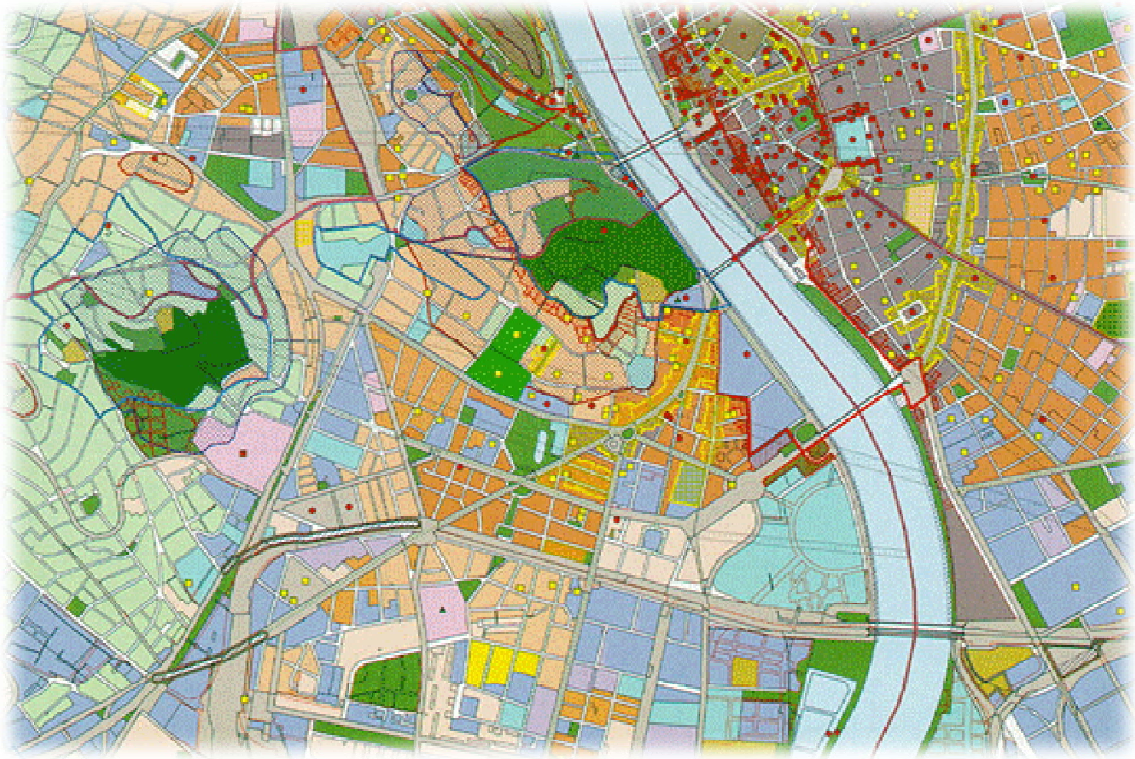
Management tools are resources used to assist communities in the successful completion of specific green infrastructure project goals and objectives.

PURCHASE OF DEVELOPMENT RIGHTS (PDR)

BACKGROUND

As defined by Craig Thiel, an analyst for the Michigan State Senate; Purchase of Development Rights are programs that are available to agriculturally sensitive areas where a landowner can sell their development rights of their property while being able to maintain the use of the property for agricultural purposes. Public Act 116 of 1974, which was re-codified in Public Act 451 of 1994 as Part 361 of the Natural Resources and Environmental Protection Act (NREPA), authorizes the State of Michigan to purchase the development rights of certain agricultural land in order to preserve the land permanently. Purchase of development rights programs are based on the concept that a piece of property has a bundle of different rights associated with it. These rights include the right to possess, use, modify, develop, lease, or convey all or a portion of the property. Specifically, the development rights associated with a piece of property represent the right of a land owner to develop the land in any manner permissible under the law. Development rights, similar to the other rights associated with a piece of property, can be separated from the property and conveyed or sold to other parties.

Michigan's PDR program allows the State to purchase the development rights of a piece of property and effectively limit the development of the land. Michigan's program ensures that the land will be restricted to agricultural uses in perpetuity. Under Michigan's PDR program, only the development rights are affected while the other rights associated with the land remain intact. The program provides land owners with a financially competitive alternative to development. Maintaining the land for agricultural uses as opposed to development also may reduce the development pressure on neighboring property owners, assuming their development rights have not been purchased by the State. Another advantage to the land owner of a PDR program is a reduction in property taxes. This occurs because the market value of the property, without the development rights, is reduced. Similarly, reduced market value can help prevent property taxes from rising as rapidly as taxes on the land with the development rights attached. A reduction in the market value of farmland also can make it much easier for an owner to pass the land on to an heir to use for agricultural purposes, as the inheritance taxes will be lower.

The Michigan Department of Agriculture (MDA), as the state land use agency, under Part 361 of NREPA, administers the PDR program. Participation in the PDR program is entirely voluntary. Land owners submit applications on a per parcel basis to the MDA, which in turn evaluates and ranks them based on criteria contained in Part 361 of NREPA. See Figure 24 for a map of counties in Michigan with

parentages land enrolled in farmland preservation. The highest priority under the criteria is productive farmland that is considered prime or unique, as determined by the United States Department of Agriculture, through the Natural Resources Conservation Service. The Michigan Department of Agriculture approves the applications and establishes a price to be paid per parcel, based on negotiations with the land owner. (Thiel)

To determine the value of development rights:

- Take the current fair market value of the property.
  - o Subtract the value of the development rights from the fair market value
- A certified appraiser completes an appraisal of the development rights.
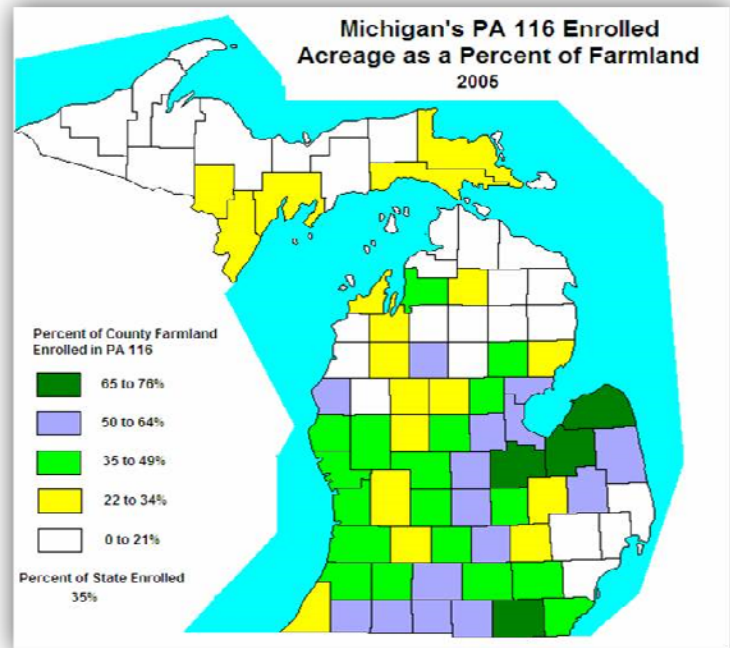
FIGURE 24: MICHIGAN PA 116 MAP

A PDR contract with a land owner may be terminated only when specific criteria are met and upon approval by the local governing body, the Michigan Commission of Natural Resources, and the Michigan Commission of Agriculture. Upon termination, the land owner must repay to the State the current fair market value of the development rights. Information obtained from the following link:
http://www.senate.michigan.gov/sfa/Publications/Issues/MichiganFarmland/MichiganFarmland.pdf

For more background information click on the following link:
http://www.plannersweb.com/wfiles/w140.html

Information about Pros and Cons of PDR:
http://wi-ei.org/uploads/media/Understanding_Purchase_Transfer_Dev_Rights.pdf

METHODS OF IMPLEMENTATION

In order to implement a PDR program,

- The local government must adopt an ordinance for a PDR program,
- http://www.ingham.org/bc/BC/INDEX/2004/04-210.htm
- A comprehensive plan that contains an agricultural preservation component
- A monitoring and enforcement plan for farmland conservation easements.

For full details on how to implement a PDR program, click on the following link.
http://www.michigan.gov/documents/MDA_REVMAPFBApplicationProcess_117312_7.pdf

FUNDING

Although Michigan's PDR program was created in 1974, sufficient funding for development rights purchases was not amassed until 1994. State funding for the PDR program comes from the repayment of tax credits and interest associated with the termination of Farmland Development Rights Agreements. These agreements, also established under PA 116 of 1974, are temporary farmland preservation tools that provide land owners with income tax and single business tax credits and special assessment exemptions in exchange for an assurance that the land will remain in an agricultural use for a minimum of 10 years and will not be developed in a nonagricultural use. Upon natural termination of an agreement, the total amount of State tax credits over the last seven years received by the land owner is due to the State.(Thiel) Information obtained from the following link:
http://www.senate.michigan.gov/sfa/Publications/Issues/MichiganFarmland/MichiganFarmland.pdf

For more information on funding options, click on the following link from the State of Michigan website:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-11788--,00.html

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

See above Case Study about Ingham County, Michigan:
http://www.ingham.org/bc/BC/INDEX/2004/04-210.htm

See above Case Study about Clinton County, Michigan:
http://www.clinton-county.org/PDR/Clinton%20County%20Farmland%20Preservation%20Ordinance.pdf

See above Case Study about Kent County, Michigan:
http://www.accesskent.com/YourGovernment/BOC/PDR/pdfs/PDR_Ordinance_Adopted.pdf

See above Case Study about Peninsula Township, Michigan:
http://www.peninsulatownship.com/developmentrights/ordinance.pdf

CASE STUDIES

Ingham County, MI

Ingham County Farmland Preservation Application is an 11 page document that contains an application, information about what PDR is, why preserving farmland in important, importance of agricultural production, how the PDR program affects agriculture, why it benefits farmers, and a Frequently Asked Questions section. Click below for full details:
http://www.ingham.org/BC/AgPreservationBoard/2009farmlandapplicationpacket.pdf

Below is information about the Ingham County Ordinance for their PDR program. The ordinance was adopted in 2004 and further describes the purpose of the PDR program and the rules and regulations that govern Ingham County's PDR program. This document explains how funding for the Ingham County PDR program is administered. In 2008, a millage was passed to help fund the program. Click below for full details:
http://www.ingham.org/bc/BC/INDEX/2004/04-210.htm

Clinton County, MI

Below is information about the Clinton County Ordinance for their PDR program. Essentially the layout is exactly the same as the Ingham County Ordinance.
http://www.clinton-county.org/PDR/Clinton%20County%20Farmland%20Preservation%20Ordinance.pdf

This site contains information about agricultural preservation and how PDR works. This site also contains application forms, a meeting calendar along with minutes and agendas for their Agriculture Preservation Board.
http://www.clinton-county.org/PDR/pdr_program.htm

Kent County, MI

The intent of purpose for the PDR program, definitions included in the PDR ordinance, how the PDR program is authorized, the preservation board that oversees admission into the PDR program along with their responsibilities, eligibility requirements, criteria for ranking and prioritizing properties, the application process, provisions of the ordinance, the duration of PDR properties, how they determine the value of agricultural easements, related costs, and information about the farmland preservation fund. Below is the 13 page document:
http://www.accesskent.com/YourGovernment/BOC/PDR/pdfs/PDR_Ordinance_Adopted.pdf

Listed below is a PDR application for Kent County. It contains a 3 page document that determines the eligibility of applicants for enrolling in the PDR program. This application consists of 18 questions about the landowner and their property. Click below for more information:
http://www.accesskent.com/YourGovernment/BOC/PDR/pdfs/PDR_Application2009.pdf

Peninsula Township, MI

Peninsula Township near Traverse City has successfully implemented a PDR program that has preserved 3-4,000 acres of land. The ordinance was approved in 1994 and has been revised in 2003. The ordinance contains 14 sections including findings and declaration of purpose, definitions, authorization, retained residential development rights, eligible lands and priority of acquisition, selection committee, the selection process, duration of acquired interests and relinquishment of any interest along with information about conservation easements, related costs, supplemental funds, township purpose, development rights acquisition fund, development rights enforcement fund, and severability. See Figure 25 to see the preservation areas within the township. Click below to read their ordinance. (16 page document).

http://www.peninsulatownship.com/developmentrights/ordinance.pdf

FIGURE 25: PENINSULA TOWNSHIP PDR MAP [P 8]
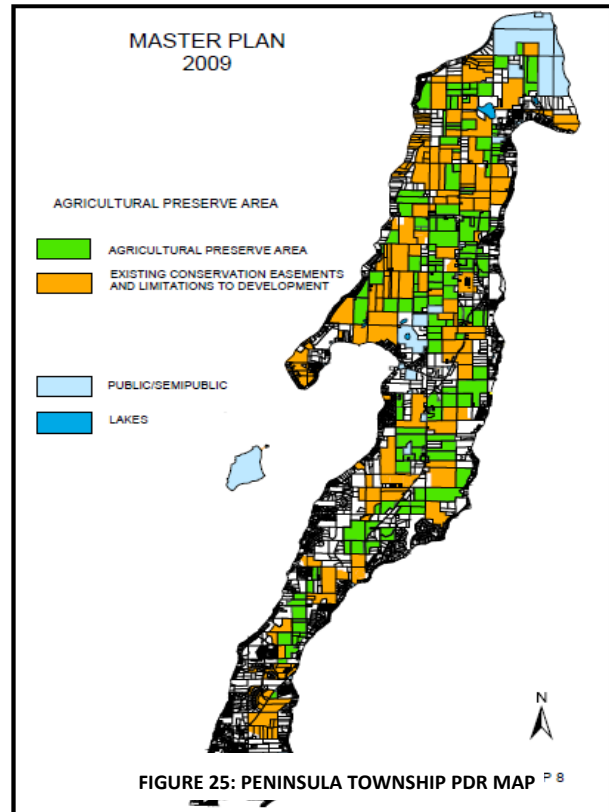
Washtenaw County, MI

Washtenaw County PDR Program with applications and related links. This website provides information about the Washtenaw PDR application, what PDR is, the Washtenaw County Agricultural Lands Preservation Advisory Committee, Michigan Agricultural Preservation Fund (State PDR Program), policies and procedures of the Michigan Ag Preservation Fund, the county PDR ordinance, Michigan Ag Environmental Assurance Program (MAEAP) which helps funding for farms to reduce pollution risks, and all townships involved in the PDR program within Washtenaw County. Click below for more information:

http://www.ewashtenaw.org/government/departments/planning_environment/planning/farmland/

DISCUSSION

The voluntary nature of the PDR program is one of its strengths. Landowners are not forced to sell their development rights and PDR permanently protects the land from development. However, some easements have clauses that allow the landowner to repurchase the development rights under specific circumstances. It converts land equity to cash and keeps farmland affordable for the next generation.

Protected farmland helps local governments balance their budgets by contributing more in tax revenue than it demands in community services.

Similarly, a drawback of the program is that it is voluntary, and it is sometimes difficult to protect large contiguous blocks of land because a landowner is surrounded by other protected farms and doesn't want to give up their development rights. Also, there are not enough funds to support all PDR requests. Finally, property owners must pay taxes on the sale of their development rights. (Report, 1997)

Based on the above sample ordinances, it is important to identify what is unique about your community and how agriculture improves the character of your community. It is important to identify the non agricultural attributes of farmland and how they contribute to open space and natural resource benefits. Within the ordinance, state and local policies that are relevant to the program should be identified to help reinforce the intent of the program. Each program has a purpose section identifying the above items. The ordinances have a definition section that identifies terms relevant to Purchase of Development Right Programs and farmland. All ordinances have an authorization section stating how the programs will operate. Each ordinance should name the board that is responsible for administering the program and how properties are selected for the program. Also an ordinance should contain the provisions of conservation easements. Lastly an ordinance should contain an effective date for when the ordinance is adopted.

For more information benefits and drawbacks to PDR programs, click on the following links:
http://www.senate.michigan.gov/sfa/Publications/Issues/MichiganFarmland/MichiganFarmland.pdf

Information containing introductory information as well as pros and cons of a PDR:
http://wi-ei.org/uploads/media/Understanding_Purchase_Transfer_Dev_Rights.pdf

TRANSFER OF DEVELOPMENT RIGHTS (TDR)

BACKGROUND

The Transfer of Development Rights (TDR) program allows landowners to transfer the right to develop one parcel of land to a different parcel of land. Generally, TDR programs are established by local zoning ordinances. In the context of farmland protection, TDR is used to shift development from agricultural areas to designated growth zones closer to municipal services.

The parcel of land where the development rights originate is called the "sending" parcel. When the rights are transferred from a sending parcel, the land is restricted with a permanent conservation easement. The parcel of land to which the rights are transferred is called the "receiving" parcel. Buying these rights generally allows the owner to build at a higher density than
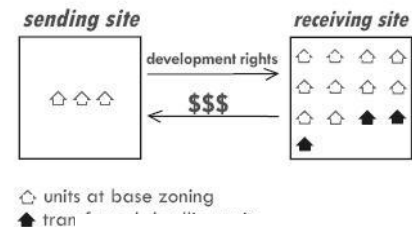
FIGURE 26: KING COUNTY, WA TDR DIAGRAM

ordinarily permitted by the base zoning. See Figure 26 for a visual diagram of a TDR sending and receiving zone.

In Michigan, TDR programs are not enabled in state statute. However, they are partially accomplished through the use of Planned Unit Development overlay zones for identifying sending and receiving areas. TDR programs are based on the concept that property owners have a bundle of private property rights, including the right to use land, lease, sell and bequeath it, borrow money using it as security, construct buildings on it and mine it, subject to reasonable local land use regulations. Some or all of these rights can be transferred or sold to another person. When a landowner sells property, generally all the rights are transferred to the buyer. TDR programs enable landowners to separate and sell the right to develop land from their other property rights. TDR is most suitable in places where large blocks of land remain in farm use. In communities with a fragmented agricultural land base, it is difficult to find a viable sending area. Jurisdictions also must be able to identify receiving areas that can accommodate the development to be transferred out of the farming area. The receiving areas must have the physical capacity to absorb new units, and residents of those areas must be willing to accept higher density development. Often, residents of potential receiving areas must be persuaded that the benefits of protecting farmland outweigh the costs of living in a more compact neighborhood. (Center, 1997)

TDR programs are distinct from purchase of agricultural conservation easement (PACE) programs because they involve the private market. Most TDR transactions are between private landowners and

developers. Local governments generally do not have to raise taxes or borrow funds to implement TDR. A few jurisdictions have experimented with public purchase and "banking" of development rights. A TDR bank buys development rights with public funds and sells the rights to private landowners. Information obtained from the following link:

http://www.farmlandinfo.org/documents/27746/FS_TDR_1-01.pdf

For more background information, please click on the following links:
Commercial Investment Real Estate Magazine article on TDR programs preserving natural and historic sites.
http://ciremagazine.com/article.php?article_id=915

A factsheet about TDR from Ohio State University:
http://ohioline.osu.edu/cd-fact/1264.html

METHODS OF IMPLEMENTATION

Several basic elements need to be in place for a successful TDR program according to John B. Bredin, JD, in an American Planning Association report.

- These include the existence of a valid public purpose
- A clear designation of the sending and receiving areas
- Recording of the development rights as a conservation easement

From a financial standpoint,

- Must be development pressure in the area.
- Developers must not be allowed extra density via variances or other methods outside the TDR program; otherwise there will be little incentive for them to purchase TDRs.
- Must be a comprehensive plan and proper zoning if the program is to achieve the stated objectives of preserving designated areas.
- Zoning in the area must protect against variances. For example, the comprehensive plan should prevent developers from obtaining variances to increase density. If they are able to do this they do not need to purchase TDRs, therefore undermining the program.

TDRs currently are valued by the market, meaning the price the seller is willing to accept and the buyer is willing to pay. Some planners suggest the county establish, fund, and operate a TDR bank, buying from landowners and selling to land developers. This would establish a predictable value for the TDR. While government agencies cannot force landholders to sell their land interests, TDR programs can be seen as mandatory in that a TDR must be purchased in order to develop a piece of land. Even though there is no law mandating the sale of a TDR, the zoning and master plan have the effect of forcing a purchase by developers. For more information click below on the following links to obtain background information about TDR programs.

Resources for the Future website; with an article on how to make markets for development rights work:
http://www.rff.org/documents/RFF-DP-05-45.pdf

Commercial Investment Real Estate Magazine article on TDR programs preserving natural and historic sites:
http://ciremagazine.com/article.php?article_id=915

FUNDING

TDR programs are typically funded through private transactions between landowners and developers.

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

See above Case Study for Benzie County, Michigan for a brief narrative. Click below to see ordinance:
http://www.benzieco.net/PDF/Planning_Zoning/OSNRPP_Chapter5.pdf

CASE STUDIES

Benzie County, Michigan

> Below contains an ordinance containing a TDR program in Benzie County, Michigan. It states that there is no separate statutory authority to use TDR in Michigan. This creates problems for communities trying to implement TDR programs. Townships in Michigan have been able to establish Planned Unit Development (PUD) districts with overlay zones to establish sending and receiving areas. This could accomplish TDR but does not permit cross jurisdiction transfers, which are necessary to make TDR viable. County and Township zoning does not apply in cities and villages, and those areas contain the infrastructure to handle receiving zones whereas the sending zones are outside of cities and villages such as the rural areas.
> http://www.benzieco.net/PDF/Planning_Zoning/OSNRPP_Chapter5.pdf

King County, Washington

> Since the year 2000, 137,500 acres of rural and resource lands or almost 215 square miles have been protected from development by King County, Washington's TDR program. King County is located near Seattle, WA. This website contains their ordinance language and program overview of how their TDR program functions. This site provides TDR market information, TDR exchange, sending site criteria, receiving site information, and information about their TDR Bank. Please click below for more details:
> http://www.kingcounty.gov/environment/stewardship/sustainable-building/transfer-development-rights.aspx

Boulder County, Colorado

> The TDR program began in 1995 provides a comprehensive guide about TDR. It contains general definitions, PUD's and TDR's, TDR sending sites, TDR receiving sites, and the exchange process. Click below for more information:
>
> http://www.bouldercounty.org/lu/planning_division/tdr_program/

Summit County, Colorado

> This TDR program has shown the benefits of multijurisdictional plans to help preserve critically sensitive areas by adopting joint master plans. 6,000 to 7,000 acres have been identified to be preserved. The county has also established a successful TDR bank that helps create a predictable price for development rights. Click below for more information:
>
> http://www.sprawlaction.org/halloffame/IBluebasin.html

DISCUSSION

Benefits of using TDR are that it gives equitable compensation to landowners whose land is zoned for agriculture. TDR promotes private financing of land protection rather than public financing. Finally, it ties farmland conservation to growth management, downtown revitalization and infrastructure efficiency by directing growth to appropriate areas. See Figure 27 to see a visual depiction of density with TDR and without in a zoning district. Some drawbacks of TDR programs are that they are very complicated to develop and administer. It requires a great deal of "buy-in" from farmers, homeowners accepting increased density in their area, and developers who pay for TDR's. Finally, it relies on an active real estate market to maintain the balance between land protection and compensation. Without land to develop, a TDR program does not work. For more information follow this link:
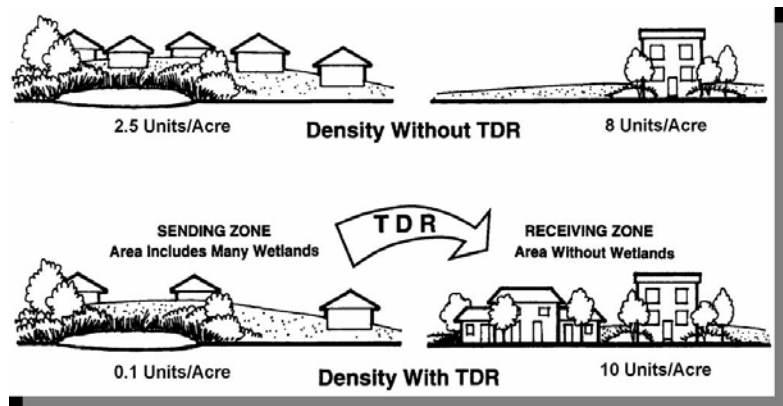
FIGURE 27: MSU PLANNING AND ZONING CENTER

http://wi-ei.org/uploads/media/Understanding_Purchase_Transfer_Dev_Rights.pdf

There are several essential elements to crafting a constitutional and effective TDR program:

- A clear and valid public purpose for applying a TDR program, such as open space preservation, agricultural or forest preservation, or the protection of historic landmarks. It's necessary to have a clear designation of the sending areas and the receiving areas, preferably on the zoning map.
- There needs to be consistency between the location of sending and receiving areas and the policies of the local comprehensive plan, including the future land-use plan map.

- There should be records of the development rights as a conservation easement, which will inform future owners of the restrictions and make them enforceable by civil action.
- There should be uniform standards for what constitutes a development right, preferably based on measures like density, area, floor-area-ratio, and height, should be used to determine what development right is being transferred.
- A sufficient amount of pre-planning in the receiving area, including provisions for adequate public facilities are essential for a successful TDR.
- A TDR needs to have enough allowable density in the receiving area to help ensure development is economically viable. If the receiving area is zoned to allow development at market capacity without the TDRs, there will be little demand for the TDRs and their market value will be diminished.

A final basic question that enabling statutes of do not directly resolve is whether TDR programs should be voluntary or mandatory.

Voluntary TDR programs

- Takings challenges are eliminated when the transaction is contractual between a developer and a property owner.

Mandatory TDR programs

- Only a mandatory TDR program will ensure all parcels in the sending area will transfer their development rights.

Local governments may see a need for either approach depending on their circumstances. For more information follow this link:

http://depts.washington.edu/open2100/pdf/3_OpenSpaceImplement/Implementation_Mechanisms/transfer_development_rights.pdf

Based on the fact that the State of Michigan does not have enabling legislation to use TDR in Michigan, it is difficult to implement such programs at this time. A few townships have been able to work around this by creating Planned Unit Development overlay districts to identify sending and receiving zones. However, they are not allowed to be used across jurisdictions. Typically, the service boundaries of areas designated for development (receiving zones) are in cities whereas areas of desired lower density are in townships or sending zones. Within a single jurisdiction, there would have to be zones appropriate for infill development as well as down-zoning areas for a TDR program to work. A more effective scenario to achieve a TDR is through an intergovernmental agreement between two jurisdictions. This would be difficult to achieve since each jurisdiction would have to have benefits, a solution could be revenue sharing of the receiving zone jurisdiction with the sending zone jurisdiction. To the knowledge of our Practicum group, this has not been done in Michigan for this purpose. This could potentially be

accomplished within the Tri-County region with the use of the Urban Service Boundary plan. If there were an agreement between jurisdictions, a regional plan to effectively plan for development and growth could be accomplished. Certain areas in the Tri-County Region could be applicable for a TDR program where Township's are on the rural-urban fringe of development.
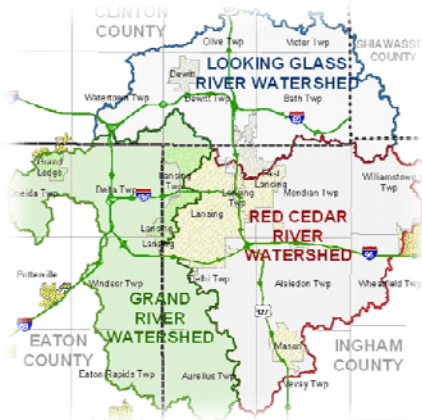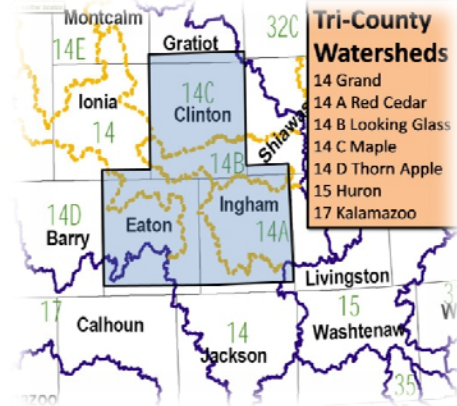
WATERSHED PLANNING

BACKGROUND

As stated by the United States Environmental Protection Agency (EPA), "A watershed is simply the land that water flows across or through on its way to a common stream, river, or lake. A watershed can be very large and drain thousands of square miles to a major river, or very small, such as a 20-acre watershed that drains to a pond." (Principles of Watershed Management, 2008)

Watershed planning is a tool designed to help communities, watershed organizations, local, state, tribal, and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. These efforts assist in the management of the water supply, water quality, drainage, stormwater runoff, water rights, and the overall planning and utilization of watersheds. According to the EPA, "Some watershed planning groups address chronic problems like degrading fisheries, while others strive to address acute problems such as contaminated mine drainage or heavy erosion along stream banks. Other planning efforts may bring

together citizen groups, local agencies and states to work together on plans for community and environmental improvements. The degree of success achieved in watershed planning greatly depends on having people that can devote substantial time to the effort." (Introduction to Watershed Planning Module).

In the Tri-County area there are seven major watersheds that encompass the counties of Clinton, Eaton, and Ingham. Most of Clinton County is covered by the Maple and Looking Glass Watersheds, while a small portion is covered by the Grand Watershed. Eaton County is also made up of three watersheds including the Thorn Apple, Grand, and Kalamazoo Watersheds. Finally Ingham County is mostly dominated by the Red Cedar Watershed and partially by the Grand, Looking Glass, and Huron Watersheds. For more detailed information on these watershed management plans refer to the Watershed Planning "Case Study" section, or click on the following link to the Greater Lansing Regional Committee for Stormwater Management (GLRC): http://www.mywatersheds.org/

To see a map of Michigan's Major Watersheds, click on the following link:
http://www.michigan.gov/documents/deq/lwm-mi-watersheds_202767_7.pdf

METHODS OF IMPLEMENTATION

The EPA recommends that municipalities follow and understand these four Core Principles of Watershed Management listed below to successfully implement a watershed program (Principles of Watershed Management, 2008):

1. Watersheds are natural systems that we can work with.

2. Watershed management is continuous and needs a multi-disciplinary approach.

3. A watershed management framework supports partnering, using sound science, taking well-planned actions and achieving results.

4. A flexible approach is always needed.

See the following link for more information on the Principles of Watershed Management:
http://www.epa.gov/watertrain/watershedmgt/index.html

The US EPA designed a Watershed Plan Builder specifically for users who are just beginning to develop a watershed plan, are in the process of developing a watershed plan, or updating an existing plan. This plan is intended to help a user get started on developing a watershed plan by guiding them through a series of questions designed to collect information about their watershed. This information will produce a customized watershed plan outline which could be used to begin working through the watershed planning process with your stakeholders to create a comprehensive watershed plan (Watershed Plan Builder).

To get started with the Watershed Plan Builder click on the following link:
http://iaspub.epa.gov/watershedplan/planBuilder.do?pageId=51&navId39&sessionActive=true

For Developing Areas

The EPA recommends the 8 Tools of Watershed Protection below, from the Watershed Academy Management Practice Module. This module outlines a watershed protection approach that applies eight tools to protect or restore aquatic resources in an urbanized or developing watershed. It describes the nature and purpose of the eight watershed protection tools, outlines some specific techniques for applying the tools, and highlights some key choices a watershed manager (used here as a catch-all term for any persons, agencies or organizations who contribute to managing watersheds) should consider when applying or adapting the tools within a given watershed (Kwon, Winer, & Schueler, 2008).

Tool 1: Land Use Planning
Tool 2: Land Conservation
Tool 3: Aquatic Buffers
Tool 4: Better Site Design

Tool 5: Erosion and sediment Control
Tool 6: Stormwater Best Management Practices (BMP)
Tool 7: Non-Stormwater Discharges
Tool 8: Watershed Stewardship Programs

Watershed protection is about making choices about what tools to apply and in what combination. The eight watershed protection tools roughly correspond to the stages of the development cycle from initial land use planning, site design, and construction through home ownership. As a result, a watershed manager will generally need to apply some form of all eight tools in every watershed to provide comprehensive watershed protection. The tools, however, are applied in different ways depending on what type of water resource is being protected. Each of these tools is an essential element of a comprehensive watershed protection approach and their goal is to provide local communities with a realistic approach for maintaining a quality environment for future generations (Kwon, Winer, & Schueler, 2008).

Click on the following link for more information on the 8 Tools of Watershed Protection, then click "Next" to continue to module:

http://www.epa.gov/watertrain/protection/index.html

For Agricultural Areas

The EPA introduces eight basic types of Agricultural Management Practices for Water Quality Protection, or BMPs which are outlined below (Agriculture Practices for Water Quality Protection, 2008).

1. Conservation Tillage - leaving crop residue (plant materials from past harvests) on the soil surface reduces runoff and soil erosion, conserves soil moisture, helps keep nutrients and pesticides on the field, and improves soil, water, and air quality.

2. Crop Nutrient Management - fully managing and accounting for all nutrient inputs helps ensure nutrients are available to meet crop needs while reducing nutrient movements off fields. It also helps prevent excessive buildup in soils and helps protect air quality.

3. Pest Management - varied methods for keeping insects, weeds, disease, and other pests below economically harmful levels while protecting soil, water, and air quality.

4. Conservation Buffers - from simple grassed waterways to riparian areas, buffers provide an additional barrier of protection by capturing potential pollutants that might otherwise move into surface waters.

5. Irrigation Water Management - reducing nonpoint source pollution of ground and surface waters caused by irrigation systems.

6. Grazing Management - minimizing the water quality impacts of grazing and browsing activities on pasture and range lands.

7. Animal Feeding Operations (AFOs) Management - minimizing impacts of animal feeding operations and waste discharges through runoff controls, waste storage, waste utilization, and nutrient management.

8. Erosion and Sediment Control - conserving soil and reducing the mass of sediment reaching a water body, protecting both agricultural land and water quality and habitat.

Click on the following link for more information on Agricultural Management Practices for Water Quality Protection:
http://www.epa.gov/watertrain/agmodule/

For Forestry Areas

Below are eight main topics the Watershed Academy has outlined on Forestry Measures for Protecting Water Quality from the EPA website. This module is about controlling impacts from common land use activities that often affect watersheds, water quality, and the conditions of aquatic ecosystems (Solari, 2008).

- Pre-Harvest Planning

- Streamside Management

- Forest Wetlands Protection

- Road Construction and Maintenance

- Timber Harvesting

- Re-vegetation

- Fire Management

- Forest Chemical Management

Click on the following link for more information on Forestry Best Management Practices in Watersheds:
http://www.epa.gov/watertrain/forestry/

The Center for Watershed Protection (CWP) offers resources for alternatives to conventional development such as Low Impact Development (LID), environmentally sensitive design, and green infrastructure. These techniques are used to minimize the negative impacts of new development on water resources and are described at the CWP as Better Site Design. In an article from the CWP called

"An Introduction to Better Site Design", better site design techniques are organized into the following three areas:

1. Residential Streets and Parking Lots

2. Lot Development

3. Conservation of Natural Areas

These three areas include methods such as reducing parking lot size and street width, and providing on-site treatment by creating open vegetated channels to allow for infiltration of stormwater or creating bio-retention areas for parking lots. Open space subdivision site designs and conservation techniques are also discussed in this resource. All of these Better Site Design examples are simple ways a community can protect their watershed resources (Holland, 2000).

For more information on Better Site Design Resources click on the following link to the Center for Watershed Protection website: http://www.cwp.org/Resource_Library/Better_Site_Design/

Further resources on site design techniques used to reduce the negative impact of development on water resources can be found in detail at the Low Impact Development, Green Building, and Infill Development sections of this document.

Handbook for Developing Watershed Plans to Restore and Protect Our Waters

> This handbook was released by the EPA in March of 2008. It is designed to help anyone undertaking a watershed planning effort, but should be particularly used for persons working with impaired or threatened waters. This handbook is intended to supplement the many good watershed planning guides developed by other agencies, universities, and nonprofit organizations. It contains in-depth guidance on quantifying existing pollutant loads, developing estimates of the load reductions required to meet water quality standards, developing effective management measures, and tracking progress once the plan is implemented. By following this step by step guide through the watershed planning process, the reader will easily be able to apply the concepts to their particular situation.
>
> For a full version of the EPA Watershed Plan Handbook, click on the following link: http://www.epa.gov/nps/watershed_handbook/

GLRC Stormwater Manuals

> The Greater Lansing Regional Committee for Stormwater Protection (GLRC) is currently developing a series of manuals for protecting water resources including one for good housekeeping and public education. Click on the following link to read the full GLRC manuals: http://www.mywatersheds.org/publications.html

FUNDING

Watershed planning requires multiple management objectives and addresses unique local concerns, while gaining interest and involvement at all geographic scales. Funding options for watershed planning efforts are no exception and gain attention from federal, state, local, and individual watershed protection projects. According to the U.S. EPA: Principles of Watershed Management, if designed well, the watershed planning process should link all watershed planning initiatives with state, local, and regional frameworks complementing and strengthening each other and individual projects.

The 2009 drafted Proposal of Sustainable Watershed Planning Act

> This is a summary prepared by the Association of State Floodplain Managers. This proposal suggests incentives to States such as federal investments including EPA grants, stimulus funds, and low cost or interest free loans. This summary also suggests much administrative support through programs such as web based coordination, public outreach, and application preparation assistance (Association of State Floodplain Managers, 2009).

> For more information on this draft proposal, click on the following link: http://documents.clubexpress.com/documents.ashx?key=s3v%2FMmLK66ue87lYMjA7RkpEHPT %2BPflOlSo%2FdSTFtDWKFQHa%2Bs1dVzeAurR%2Fyi4Z%2BQiIdwJN6IxUkflbW2Z%2BlNpAQirZZ v5E

The US EPA Catalog of Federal Funding Sources for Watershed Protection

> This web site is a searchable database of financial assistance sources such as, grants, loans and cost-sharing, available to fund a variety of watershed protection projects. To select funding programs for particular requirements, use either of two searches in the link below. One is based on subject matter criteria, and the other is based on words in the title of the funding program.

> For more information about the EPA Catalog of Federal Funding Sources for Watershed Protection, click here: http://cfpub.epa.gov/fedfund/

GLRC Funding Manual

> This manual, released in September of 2006 by the GLRC, is called "Making it Happen…Funding Obligations & Strategies for Stormwater Management". This manual is a guide for the twenty jurisdictions and county organizations belonging to the Greater Lansing Regional Committee to funding options and strategies. This document includes different sources of funding, internet resources, a sample budget, and information on borrowing, federal funding, state funding, Clean Michigan Initiative Funds, and Clean Water Act 319 Funds.

> To view this document, click on the following link to the GLRC website: http://www.mywatersheds.org/publications.html

The Institute of Water Research

> The Institute of Water Research (IWR) at Michigan State University is designed to provide information on land and water resource issues. They are responsible for coordinating research and educational programs on surface water and groundwater quality and quantity. The IWR

website lists a few important tools that are highly recommended alongside other water resource tools (Michigan State University).

IWR Projects include:

- Digital Watershed
- Great Lakes Regional Water Projects
- High Impact Targeting
- Project Brochures
- Swan Creek
- Watershed Comprehensive Assessment Tool
- Water Withdrawal Assessment Tool

For direct links to each of these tools, click on the following link to the IWR website and look under "Our Projects":
http://35.9.116.206/IWR/index.asp

The Data Tools include:

- High Impact Targeting
- Conservation Innovation Grant
- Know Your Coastal Zones
- Army Corps of Engineers (ACOE) Project
- Digital Watershed
- RUSLE (Online Soil Erosion Assessment Tool)
- National Digital Orthophoto Quarter Quads (DOQQ)
- Understanding Your Watershed
- STORET
- Michigan Water Use Data

For direct links to each of these tools, click on the following link to the IWR website:
http://35.9.116.206/IWR/Tools-Data/index.asp

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

The EPA's Smart Growth Program, in conjunction with the Office of Water, released a Water Quality Scorecard in October, 2009. According to the EPA, this scorecard offers policy options for protecting and improving water quality across different scales of land use and across multiple municipal departments. The Water Quality Scorecard was developed to help local governments identify opportunities to remove barriers and revise and create codes, ordinances, and incentives to better protect water quality. It guides municipal staff through a review of relevant local codes and ordinances across multiple municipal departments to ensure that these codes work together to support a green infrastructure approach (EPA, 2010). The two main goals of this tool are to:

1. Help communities protect water quality by identifying ways to reduce the amount of stormwater flows in a community and;
2. Educate stakeholders on the wide range of policies and regulations that have water quality implications.

For more information or to download the EPA Water Quality Scorecard click on the following link: http://www.epa.gov/dced/water_scorecard.htm

Local Ordinance

An article called "A Local Ordinance to Protect Wetland Functions" was released in 2007 depicting the key elements to an effective ordinance to protect wetlands from the indirect elements of land development. This article provides flexible ordinance guidelines as well as a model Wetland Drainage Area Protection Ordinance to assist local watersheds in the successful implementation of their own ordinances. This model ordinance suggests that local development regulations can fill this gap in wetland protection since local governments typically have control over local land use regulations and decisions. This model ordinance uses the following three concepts and principles for protecting wetlands:

- Identify sensitive wetlands
- Address wetland contributing drainage areas
- Apply wetland protection criteria

For a copy of this article click on the following link and choose the Full Article under the title: Article 4 of the Wetlands & Watersheds Article Series: "A Local Ordinance to Protect Wetland Functions": http://www.cwp.org/Resource_Library/Model_Ordinances/index.htm

Post Construction Model Ordinance

The Center for Watershed Protection created a model ordinance for Post-Construction Stormwater Management. This model ordinance created in 2008 provides code language for local, regional, and/or state stormwater programs to use when crafting or updating their ordinances. The ordinance is written so that individual sections can be lifted out and modified to suit individual program needs. The following is an example of a decision matrix found in the Post-Construction Stormwater Model ordinance (Center for Watershed Protection, Inc., 2008).

TABLE 1: POST-CONSTRUCTION ORDINANCE DECISIONS

Decision	Rationale	More Guidance
Should post-construction ordinance be combined with erosion and sediment control (construction stormwater) and/or illicit discharge detection and	Creates a comprehensive code, but can end up being a massive overwhelming document	Chapter 5

TABLE 1: POST-CONSTRUCTION ORDINANCE DECISIONS		
elimination ordinances		
Develop a separate Stormwater Design Manual to keep technical details and specifications out of the ordinance	Having a separate manual is the recommended approach, and there are likely state and local manuals to reference	Chapter 6 Tool 5: Manual Builder
Include credits for Low-Impact Development, non-structural measures, and Smart Growth techniques	These are recommended program tools. The program should develop the technical and program capabilities to include these as the program matures.	Chapters 3, 4, 6 Tool 6: Checklists
Include special stormwater criteria for important resources, such as drinking water supplies, coastal areas, wetlands, cold-water fisheries, impaired streams	Special criteria can provide extra protection for locally-important resources. The technical criteria for meeting the standards should be in the Design Manual.	Chapter 4
Determine the number and types of sites that will be subject to stormwater requirements, plan review, and site inspections	The ordinance can apply to nearly all development and redevelopment sites, or only those of a certain size, disturbed area, or impervious threshold. Applicability is a critical program decision	Chapter 5

For a PDF of the Post-Construction Stormwater Model Ordinance, click on the following link:
http://www.cwp.org/Resource_Library/Center_Docs/SW/pcguidance/Tool3.pdf

Helpful tools for creating an effective local watershed plan can be found on the Center for Watershed Protection website. Click on the link below to be provided with free access to watershed user guidebooks, reports and surveys, CDs, and example watershed plans:
http://www.cwp.org/Resource_Library/Watershed_Management/planning.htm

The Greater Lansing Regional Committee (GLRC) has created a manual called Model Ordinances for Watershed and Natural Resource Protection which can be found at the following link:
http://www.mywatersheds.org/ordinances.html

CASE STUDIES

The Upper Looking Glass River Watershed Plan, MI

The Upper Looking Glass River Watershed comprises 13 sub-basins within four counties, Shiawassee, Clinton, Ingham, and Livingston. The watershed management plan was designed to focus on the 12 sub-basins above the Remy-Chandler drain in order to avoid duplicating the stormwater planning efforts in the Remy-Chandler sub-basin. In the Upper Looking Glass River Watershed the dominant land use is agriculture, however, much of the
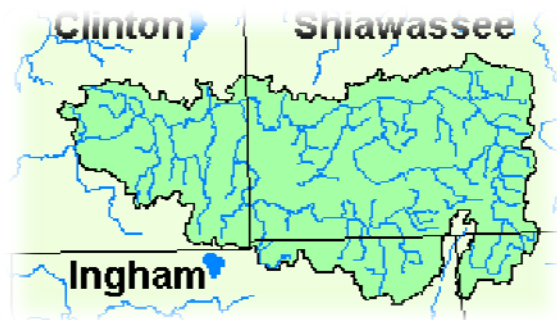
upper watershed exists in a natural state providing forest land, open fields, wetlands, and long segments of abundant tree canopies that shade the river.

The second   most prominent land use in the watershed is low-density residential. A few of the primary goals of the Upper Looking Glass Watershed plan are as follows (Public Sector Consultants Inc., 2008):

- Delineate upper watershed boundaries and surface waters
- Identify existing and desired uses of the watershed and what must be done for its protection
- Provide new tools to local governments and residents to encourage better land use decisions
- Encourage and facilitate interagency and intergovernmental cooperation in addressing land use issues and public investments of more than local concern
- Establish clear links and specific targets for enhancing/protecting the watershed
- Enhance land and habitat protection
- Identify future water quality impacts based on a build-out analysis of local townships
- Use findings of the inventory to adopt county and/or local ordinances to support protection and development standards
- Identify structural and managerial best practices targeting control of pollution sources

For a full copy of the Upper Looking Glass Watershed Plan click on the following link:
http://www.michigan.gov/documents/deq/wb-nps-upperlookingglass-wmp_284715_7.pdf

The Following is a link to the Friends of the Looking Glass River website:
http://www.lookingglassriverfriends.org/

The Carrier Creek Watershed Plan, MI

Carrier Creek is a designated Eaton County Drain, located primarily in Delta Township. It functions as a stormwater drain for approximately 11.1 square miles of Delta and Windsor townships and the City of Lansing, and is also a tributary of the Grand River. The upper portion of the watershed is largely industrial, and the lower portion is mainly residential. The Carrier Creek Watershed was approved under the Clean Michigan Initiative (CMI) administrative rules and was funded under section 319.   The Carrier Creek Restoration Project was implemented from July 2001 through December 2004. Some project goals include the following:

Eaton

- Improve water quality
- Stabilize hydrology
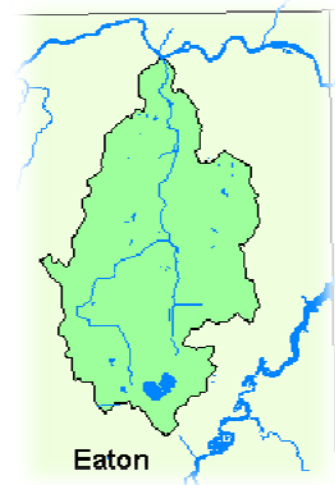
- Improve the habitat for aquatic organisms and wildlife

As of May 2008 there had been continued efforts by the Eaton County Drain Commissioner to improve the Stormwater Management and Restoration Project. The project had been separated into nine divisions that were continuously making improvements such as installing culverts under roadways, constructing detention basins to manage stormwater, and dispersing wetland plantings. The most recent project updates according to the Carrier Creek website provided construction agendas up until May 2008(Carrier Crek Restoration - CMI I, 2004).

For further details on the Carrier Creek Restoration Project click on the following link:
http://www.michigan.gov/documents/deq/ess-nps-carrier-creek_208665_7.pdf

The Upper Grand River Watershed Plan, MI

According to the Michigan DNRE website, the Upper Grand River Watershed is a 572,376 acre watershed in parts of Hillsdale, Jackson, Eaton, Washtenaw, and Ingham Counties. The land uses are about 6% agriculture, 20% urban, and 20% forestry. Before the Upper Grand River Implementation Project (UGRIP), the watershed used to be listed on Michigan's 303(d) list, which is a list that includes Michigan water bodies that are not attaining one or more designated uses and require the establishment of Total Maximum daily Loads (DMDLs) to meet and maintain Water Quality Standards. More recently, the water quality of the Upper Grand River Watershed has been significantly improved by decreasing the nonpoint source pollutants, therefore, enhancing the fish and aquatic invertebrate community composition (Upper Grand River Watershed: Watershed Summary).

In order to meet the requirements of the USEPA 319 Nine Minimum Elements of Watershed Planning as well as the National Pollutant Discharge Elimination System Phase II Requirements, a Watershed Management Plan Addendum was developed from July 2004 to June 2006 to supplement the existing 2003 Upper Grand River Watershed Management Plan. The implementation of this watershed plan addendum officially started in 2006 and is planned to continue well into 2030 in order to successfully maintain goals such as education, development standards, natural features protection and recreation assessment and improvements (Upper Grand River Watershed Managment Plan Transition, 2006).

The success of the Upper Grand River Water Management Plan is undeniable; however, this management plan was last rewritten in 2003 and could use an updated version.

To see a full version of the 2003 Upper Grand River Management Plan click on the following link: http://www.michigan.gov/documents/deq/ess-nps-wmp-upper-grand_208998_7.pdf

To see the Upper Grand River Watershed Management Plan Transition document to supplement the 2003 Grand River Management Plan, click on the following link: http://www.michigan.gov/documents/deq/ess-nps-fs-upper-grand-planning_207977_7.pdf

For information on other watersheds in the Tri-County Region click on the following links to the Thornapple River and Friends of the Maple River websites:

Thornapple River Plan, MI
> Thornapple River Watershed Plan: http://www.barrycd.org/TRWP.html
> Thornapple River Watershed Council: http://www.thornappleriver.org/

Friends of the Maple River, MI
> Friends of the Maple River Website: http://www.friendsofthemapleriver.org/

DISCUSSION

Growth and development from communities are stressing water resources. Community based watershed management helps reduce flood damage, decreases the loss of green space, reduces soil erosion and improves water quality. Watershed management planning works to protect water resources by empowering local people to provide for the environmental, social, and economic health of the community.

Some benefits of a successful watershed plan are that it creates a context for irrigation by using practical, tangible management units that people understand and focuses on coordinating efforts and by finding common ground and meeting multiple needs. This plan would provide a better understanding and appreciation for nature by underlining the need for understanding nature's interrelated processes, linking human activities to nature's response and appreciating how nature's processes can benefit people. A successful watershed plan and a healthy watershed will also yield better management by generating ecologically-based, innovative, and cost-effective solutions while forging stronger working relationships (Principles of Watershed Management, 2008).

Other benefits of a healthy watershed include:

- supporting consistent, continuous management

- habitat for fish and other life

- food sources for animals and people

- temporary living quarters for migratory birds

- drinking water for people and other living organisms

- purifying air of contaminants our communities emit

- assimilating contaminants that enter the water

- transporting goods and people

Watershed management plans, when used correctly, allow communities located along streams and rivers to learn how the river functions as well as learn to draw many benefits. However, in order to manage and significantly change the behavior of a watershed, it becomes very costly when implementing and continuously maintaining necessary man-made changes. Also, despite the on-going maintenance, communities may still remain vulnerable to floods and other disasters. On the upside, if sensible decisions on activities near a watershed are made, a community can avoid a costly maintenance burden while sustaining their community's use and enjoyment of a healthy river system(Principles of Watershed Management, 2008).

For more advantages and disadvantages of watershed planning, click on the following link to the Principles of Watershed Management Module:
http://www.epa.gov/watertrain/watershedmgt/principle1c.html

In order to have a successful watershed plan it is necessary that all member of the watershed be in participation. Everyone lives within a watershed, and without state, local, and regional frameworks working together to complement and strengthen each other and individual projects, it is unlikely that a plan will be successful. According to the U.S. EPA Principles of Watershed Management, "There are three common elements of successful watershed management. The first is the watersheds themselves and secondly, stakeholder involvement; which can be both active watershed partners and active citizens that live in the watershed. The third element is the never-ending

3 Common Elements of Successful Watershed Management

management cycle where all partners will agree on items including activities they will work on together. Along with these three common elements it is crucial that there is public input along the way and that every step of the process is aimed at taking action and tracking results" (Principles of Watershed Management, 2008).
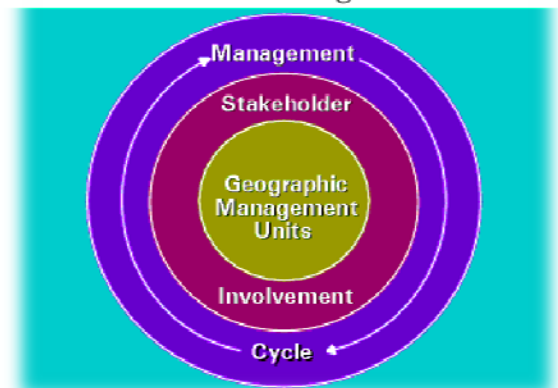
CONSERVATION EASEMENTS

BACKGROUND

A conservation easement is a tool for landowners and communities to protect natural resources and preserve scenic open space. According to the Michigan Department of Agriculture, "A conservation easement is a voluntary, legally recorded agreement between a landowner and the State of Michigan (or another qualified conservation organization) that restricts land to agricultural and open space uses. The easement, once donated to the State of Michigan, is held in perpetuity and cannot be sold or transferred to another entity.   The easement generally prohibits or limits any subdivision, development, or any activity that would diminish the agricultural or open space value of the land. A conservation easement donation is a protection tool that can offer benefits to landowners wishing to protect their farmland or open space and may provide a federal income tax deduction. It provides a flexible approach to permanently protecting land while keeping it in private ownership" (Conservation Easement Donation Brochure).

Landowners may voluntarily limit the ability to develop their property by placing a conservation easement on property, thereby permanently protecting its open space and/or agricultural values. The easement does not require public access on the property, though the landowner and/or community may specify so. The types of land that can be protected by a conservation easement include any land whose conservation is in the public interest such as, woodland, wetlands, farmland, scenic areas, historic areas, wild and scenic rivers, and undisturbed natural areas (Conservation Easement Donation Brochure).

For more information on conservation easements, click on the following link to the Department of Agriculture Conservation Easement Donation Brochure as well as a list of frequently asked questions: http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-146458--,00.html

Potential Conservation Areas of Assessment for the Tri-County Area

The Michigan Natural Features Inventory, a program of Michigan State University Extension prepared a Potential Conservation Areas Assessment for Clinton, Eaton, and Ingham counties. According to this 2008 document, Potential Conservation Areas (PCA's) are defined as places on the landscape dominated by native vegetation that have various levels of potential for harboring high quality natural areas and unique natural features.   This report identifies and ranks the PCA's remaining in the Tri-County area. The scoring criteria used to prioritize sites throughout the Tri-County included: total size,
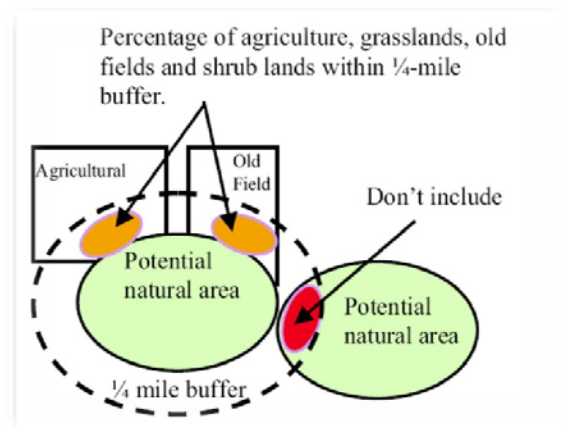
size of core area, length of stream corridor, landscape connectivity, and restorability of surrounding land, parcel fragmentation, vegetation quality, and biological rarity score (Paskus & Enander, 2008).

The results from the PCA for Clinton, Eaton, and Ingham proved that the Tri-County region has several high quality natural areas that still look and function the way they did 200 years ago. Of the remaining high quality sites, some have the potential of harboring endangered, threatened, or special concern animal and plant species. With the high rate of development and its associated stresses on the natural environment, this assessment found that the conservation of these remaining areas and their native plant and animal populations are vital if the Tri-County region's diverse, natural heritage is to be conserved (Paskus & Enander, 2008).
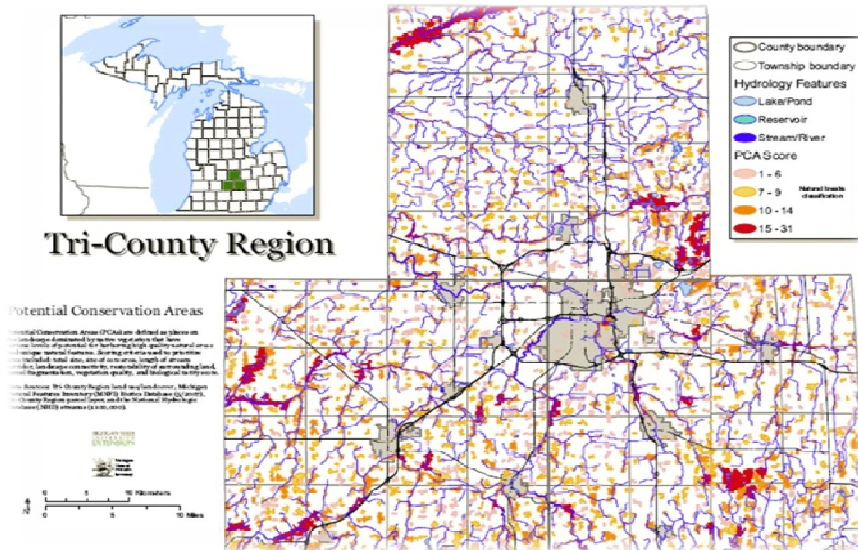
For a full copy of the PCA Assessment for the Tri-County Region, click on the following link: http://www.tri-co.org/TRANSPORTATION%20PLANNING/Potential%20Conservation%20Area%20Assessment.pdf

METHODS OF IMPLEMENTATION

According to the United States Environmental Protection Agency (US EPA), "Conservation easements are typically aimed at preserving agricultural lands and natural areas threatened by development. For rapidly urbanizing areas, conservation easements may be a way to preserve open space before land prices make the purchase of land containing important cultural and natural features impractical for governmental agencies with limited budgets. Conservation easements are not often used in ultra-urban areas, due to both the lack of available open space for purchase and the high cost of undeveloped land. In addition, private land trusts may limit the size and type of the land that they are willing to manage as conservation easements." (Conservation Easements, 2006).

Conservation Reserve Program (CRP)

According to the United States Department of Agriculture (USDA) Farm Service Agency (FSA), the CRP is a voluntary program for agricultural landowners. Through this program one can receive annual rental payments and cost-share assistance to establish long-term or resource conserving covers on eligible farmland. The benefits CRP include protecting millions of acres of topsoil from erosion as well guarding the Nation's natural resources. By reducing water runoff and sedimentation, CRP protects groundwater and helps improve the condition of lakes, rivers, ponds, and streams. This program is a major contributor to increased wildlife populations in many parts of the country (USDA Farm Service Agency, 2009).

For more information on the Conservation Reserve Program, click on the following link to the USDA website: http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp

Wetlands Reserve Program (WRP)

According to the USDA Natural Resources Conservation Service (NRCS), the WRP is voluntary program for the restoration and protections of wetlands on private property. WRP allows land that was formerly wetland to be converted back to the original state. Technical and financial assistance is provided in return for placing a conservation easement on the property. This is done either permanently or for a period of 30 years. For restoration and enhancement practices on the WRP easement, financial assistance is provided to the landowner (USDA, NRCS, 2010).

For further resources and information on the Wetlands Reserve Program, click on the following link to the USDA NRCS website: http://www.mi.nrcs.usda.gov/programs/wrp.html

Grasslands Reserve Program (GRP)

This program offers landowners to protect privately owned grasslands. In the 2008 Farm Bill, the GRP was re-authorized with the intent of supporting grazing operations and shrublands from the threat of conversion to uses other than grazing. The program also supports maintaining and improving plant and animal biodiversity on the GRP easement. There are a few enrollment options including:

- Permanent Easements

  o Where payments are based on the fair market value of the property less the grazing value

- Rental Agreements

  o Options include 10, 15, or 20-years

  o 75% of the grazing value will be paid in annual payments for length of the agreement

- Restoration Agreements

o Payments of not more than 50% for the cost of carrying out the conservation practices or activities (Grassland Reserve Program (GRP))

For more resources on the Grassland Reserve Program click on the following link:
http://www.mi.nrcs.usda.gov/programs/grp.html

Environmental Quality Incentive Program (EQUIP)

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program administered by the USDA Natural Resources Conservation Service (NRCS). It supports production agriculture and environmental quality. Through EQIP, farmers and ranchers may receive financial and technical assistance to implement structural and land management conservation practices on eligible agricultural land.

Eligible producers are individuals engaged in livestock or crop production. Eligible land includes cropland, rangeland, pasture, and private non-industrial forestland. State priorities are developed annually from input from local workgroups based on county resource assessments and individual plans to address those local needs. A State Technical Committee comprised of representation from these local work groups, Tribal groups, commodity groups, and conservation partners advise NRCS on the implementation of EQIP (Environmental Quality Incentives Program (EQIP) 2010, 2010).

For more information on the EQUIP and its programs, click on the following link:
http://www.mi.nrcs.usda.gov/programs/eqip.html

For a detailed Conservation Easement Check List, visit the Michigan.gov document by clicking on the following link:
http://www.michigan.gov/documents/deq/lwm-wetlands-conservationeasementchecklist_263028_7.pdf

The Conservation Easement Landowner Questionnaire was developed to aid the landowner in deciding whether a conservation easement fits in with their land protection and financing planning goals. Click the following link to view the questionnaire from the Michigan Government website:
http://www.michigan.gov/documents/MDA_PDR_Questionaire_164131_7.pdf

Conservation Districts

According to the Michigan Conservation Districts website, "Michigan's conservation districts are "unique" local units of State Government, which utilize state, federal and private sector resources to solve today's conservation problem" (Local Districts, 2008). For all conservation districts, decisions on conservation issues should be made at the local level, by local people, with technical assistance provided by government. These districts are referred to as "gateways" in their local communities and provide linkages between land managers and a host of

conservation service providers that include state, federal and local governments, conservation organizations, and Internet resources (Local Districts, 2008).

The 79 conservation districts currently in Michigan were created to manage natural resources and take an ecosystem approach to conservation and protection. These conservation districts are the local providers of natural resource management services that help citizens conserve their lands and the environment for a cleaner, healthier, economically stronger Michigan. The programs carried out by conservation districts are as diverse as the landscape of Michigan. "In southern Michigan, many of the programs deal with conservation needs of the farm community while in the northern Michigan; there is more emphasis on forestry, wildlife, water quality, and recreation. Conservation districts continue to expand into diverse areas of natural resource management, rising to meet the environmental challenges of their local communities" (Local Districts, 2008).

According to the Michigan Association of Conservation Districts, conservation districts in Michigan are similar in these following characteristics:

- They are special purpose local units of government.

- Most are organized along county boundaries.

- Each is governed by a five member, locally elected, board of directors.

- They provide quality and cost effective conservation technical assistance and information to landowners and citizens

- They provide conservation improvement to the land while fostering the understanding and wise management of Michigan's natural resources.

In the Michigan Tri-County area there are three conservation districts: the Eaton, Ingham, and Clinton Conservation Districts. Each belongs to the Michigan Association of Conservation Districts, and therefore, maintains the typical characteristics listed above. These three conservation districts focus on natural resource issues and solutions for their respective land area as well as all work together with their neighboring counties. Specific contact information for each of the Tri-County Conservation Districts is listed below (Local Districts, 2008):

Clinton Conservation District	Ingham Conservation District	Eaton Conservation District
2344 N. US-27	1031 W. Dexter Trail	551 Courthouse Drive, Suite 3
St. Johns, MI 48879	Mason, MI 48854	Charlotte, MI 48813
Phone: (989) 224-3720 ext. 3	Phone: (517) 676-2290	Phone: (517) 543-5848 ext. 3
info@clintonconservation.org	sheron@inghamconservation.org	http://www.eatoncounty.org/Departments/ECD.htm
http://www.clintonconservation.org/index/1	http://www.inghamconservation.com/	

For information on conservation districts across Michigan or to find a local district near you, click on the following link:

http://www.macd.org/local_districts.html

Through the Conservation District Training Program, the Michigan Association of Conservation Districts (MACD) has developed thirteen "self-taught" training modules that can be used to teach directors and staff the basic operations of conservation districts. These modules cover topics that include, but are not limited to, the basics of Michigan conservation districts, the history and future of conservation districts, conservation partners, conservation district finances, and outreach solutions. The intent of these modules is to have education materials readily available to conduct "in-house" training in District offices. These thirteen modules are very useful to inform new directors or staff members when state sponsored training is not immediately available. Each module includes reference materials and facilitators notes and should take 15- 30 minutes to complete (Resources: Conservation District Training Tools).

To complete the Conservation District Training Module from the Michigan Association of Conservation Districts website, click the following:

http://www.macd.org/district_resources.html

Agricultural Areas

The Farmland and Open Space Preservation Program (PA 116 of 1974):

This program is designed to preserve farmland and open space through agreements that restrict development, and provide tax incentives for program participation. The act enables the farm owner to enter into a Development Rights Agreement with the state. The agreement ensures that the land remains in agricultural use for a minimum of 10 years, and is not developed for any non-agricultural use. In return for maintaining the land in agricultural use, the landowner may be entitled to certain income tax benefits, and the land is not subject to special assessments for sanitary sewer, water, lights or non-farm drain projects (Farmland Agreements, Enrollment, Eligibility, & Benefits: The Farmland and Open Space Preservation Program (PA116)).

For more information on agricultural preservation refer to the PDR section of this document.

FUNDING

According to the Maryland Environmental Trust, "The value of an easement gift varies with each easement. Generally, the more the easement restricts the uses of the property, the higher the value of the gift, and hence the higher the tax deduction. To determine the easement value, the land must be appraised at both its fair market value without the easement restrictions, and its fair market value with the easement restrictions. The difference between these two appraisals is the easement value, from which the tax deductions are derived." (Commonly Asked Questions about Conservation Easements).

For more detailed information on tax regulations related to conservation easements, click on the following link:
http://www.landtrustalliance.org/policy/taxincentives/fed-tax-regs

According to the Land Trust Alliance, "on August 3, 2006 the Congress approved a tremendous expansion of the federal tax incentives for conservation easement donations. In 2006 and 2007 the tax incentive helped America's land trusts increase the pace of land conservation by at least 535,000 acres compared to the previous two years"(How the Easement Incentive Works).
This Law Raises the maximum deduction a donor can take for donating a conservation easement from:

- 30% of their adjusted gross income (AGI) in any year to 50% to;

- Allows qualified farmers and ranchers to deduct up to 100% of their AGI; and

- Increases the number of years over which a donor can take deductions from 6 years to 16 years.

These changes enable family farmers, ranchers, and other moderate-income landowners to get a significant tax benefit for donating a conservation easement on their land (How the Easement Incentive Works).

For more easement incentives click on the following link from the Land Trust Alliance.
http://www.landtrustalliance.org/policy/taxincentives/federal/incentive-info

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

The Agreement for Conservation Easement document found in the link below is an agreement to protect the functions and values of existing or established wetlands and its natural resource values on the Easement Premises. This agreement is consistent with the Permit and the protection of the benefits to the public and requires the grantor to maintain the Easement Premises in its natural and undeveloped condition.
http://www.michigan.gov/documents/deq/lwm-wetlands-conservationeasements_263027_7.pdf

The following link is an example of a conservation easement application for Michigan open space properties:

http://www.michigan.gov/documents/MDA_ConservationEasement_164018_7.pdf

The Following link is a map of the donated conservation easements in Michigan as of December 2008:

http://www.michigan.gov/documents/mda/2Oct08DntdCsvtnEsmnts_258938_7.pdf

Agricultural Areas

To acquire an application for a designated open space easement from the Michigan Department of Agriculture and Farmland and Open Space Preservation Program, click on the following link:

http://www.michigan.gov/documents/mda_DOSE_Application_Form_51765_7.pdf

CASE STUDIES

Rogue River Conservation Easements Project, MI

The Rogue River Conservation Easements Project started in April of 2004 and was completed by December 31st, 2006. The Rogue River Watershed is a major tributary to the Grand River which is located 25 miles north of Grand Rapids, MI. Fragmentation of the natural landscape and the increase of impervious surfaces in the ground-water fed river system were the main threats concerning the river's continued health. The prime trout fisheries that lie within the Rogue River were protected through three conservation easements created through these efforts. Efforts of this successful Rogue River project have led to a 270-acre conservation easement, protection of 2,000 feet of Rogue River frontage, and annual load reductions in 16 tons of sediment, 79 pounds of Phosphorus, and 851 pounds of Nitrogen. This Michigan project laid the ground-work for land conservation in the watershed for years to come (Rogue River Conservation Easement Project, 2006).
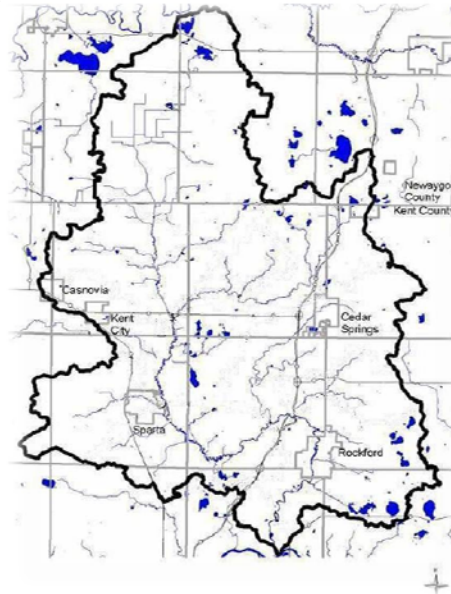
For more detailed information on the Rogue River Conservation Easement Project, click on the following link:

http://www.michigan.gov/documents/deq/ess-nps-RogueConservationEasement-fs_229400_7.pdf

DISCUSSION

The following information was obtained from a 2003 document on conservation easements from The Nature Conservancy. This document provides background information on conservation easements and

details the many benefits to the public, environment, and future generations (Conservation Easements: Conserving Land, Water and a Way of Life, 2003).

Conservation easements benefit the public and the environment.

- Conservation easements conserve watersheds and aquifers, helping ensure a clean supply of water for public use.

- Conservation easements buffer treasured national parks, from Yellowstone to Canyonlands, from development and human activity. Easements lands help protect migratory corridors for wide-ranging animals such as elk and bears, which do not confine their movements to the boundaries of a park. They are also used to buffer other public lands such as military bases and national forests.

- Conservation easements protect open space and enhance the quality of life in rapidly growing urban and suburban areas.

- Conservation easements preserve agricultural lands, from family farms to ranches to timberlands. And easement lands on which use is restricted to agriculture often generate more in local revenues than they require in community services.

Conservation easements keep land in private hands and preserve traditional land uses

- Private property subject to a conservation easement remains privately owned, and landowners often continue to live on the property.

- The option to place conservation easements on private land is an important private property right that comes with land ownership in the United States.

- Conservation easements are individually tailored to protect targeted conservation values and to meet the landowner's needs.

- Many types of private land use, such as farming, ranching and timber harvesting, can continue under the terms of a conservation easement. The easement may require the landowner to take certain actions to protect land and water resources, such as fencing a stream to keep livestock out.

Conservation easements protect land for future generations

- Most conservation easements remain with the property, even if it is sold or passed on to heirs. Current and future landowners are bound to the easement's restrictions in perpetuity.

- Landowners place conservation easements on their property because they want to protect it beyond their lifetimes. Easements help them fulfill their vision for the future of their lands and waters.

- Through conservation easements, landowners can more easily pass on land to their children and grandchildren.

- By removing the land's development potential, an easement can result in lowered estate taxes. Such a tax reduction can make a critical difference in the ability of heirs to keep the land intact; the alternative has often been subdividing the land to pay heavy estate taxes.

The previous information on benefits was obtained at the following link from The Nature Conservancy: http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/files/consrvtn_easemnt_sngle72.pdf

According to the US EPA, a number of limitations exist for using conservation easements as a stormwater management tool (Conservation Easements, 2006).

- Conservation easements are often not an option in more urbanized areas, where the size, quality, and cost of land restricts their use, however, exceptions may be found in some Michigan cities such as Detroit and Flint.

- Some easements may not be held in perpetuity, which means that land could still face development pressure in the future.

- Easements also may not provide for the filtering of pollutants from concentrated flows.

Other limitations include the following:

- Easements restrict the development of a property; therefore, the market value of the land may be reduced.

- Also, the landowner who donated the easement remains the owner of the land. This means that when the land is bought and sold, the easement "runs with the land" and applies to all future landowners.

HEALTH IMPACT ASSESSMENT (HIA)

BACKGROUND

Health Impact Assessments (HIA) are a new "up and coming" process for determining the overall public health impact a project may have. According to the World Health Organization, "Health Impact Assessment (HIA) is a means of assessing the health of policies, plans and projects in diverse economic sectors using quantitative, qualitative and participatory techniques." (World Health Organization, 2010). HIA helps planners through the design/development phase of projects by allowing them to see the overall impact the project will have on the health of the public. The assessment process includes items such as transportation methods, water quality, waste water quality, air quality, social & hazardous waste disposal, noise considerations/impacts, physical activity and injury prevention, health equity, overall regional growth compliance, etc. "HIA helps decision-makers make choices about alternatives and improvements to prevent disease/injury and actively promote health." (World Health Organization, 2010).

During a HIA, critical questions should be asked:

What?   What impacts should be assessed? Question the impacts on health outcomes, determinants and risks to health, and whether these should include an equity component.

How?   Integrate HIA into existing planning development processes. Must there be a legal mandate or governmental regulations, or a resolution of support?

When?   During the pre-application process.

Who?   Local county planners and GIS technicians.

Where?   At the local and county levels.

For more information see the following link:
http://www.euro.who.int/document/PAE/Gothenburgpaper.pdf

For more information see the following link:
http://www.who.int/hia/en/

METHODS OF IMPLEMENTATION

A HIA should follow a specific process with criteria based on the project as all projects are different and may have more or less stringent health impacts. These are the stages of involved in a HIA as developed by Scotland:

- **SCREENING**   The first stage is to select proposals that should be subjected to HIA.

- **GETTING THE HIA TEAM TOGETHER**   HIA needs input from a team of people to provide different perspectives and areas of expertise.

- **SCOPING**   This means setting the boundaries of the HIA: the geographical scope, the population groups whose health is considered, and the timescale over which to predict impacts.

- **IDENTIFYING IMPACTS**   This means identifying possible health consequences of the proposal.

- **ASSESSING IMPACTS**   This means assessing the identified impacts, in order to inform recommendations to improve the health consequences.

- **MAKING RECOMMENDATIONS**   The HIA should include recommendations to adjust the proposal to maximize positive and minimize negative health impacts.

(Public Health Institute of Scotland, 2006)

The Center for Disease Control (CDC) has also created a similar guide for implementing a HIA. See the following link for more information:
http://www.cdc.gov/healthyplaces/publications/Health_Impact_Assessment2.pdf

Developing the list of criteria for assessing various projects should be listed out in a form that a planner or developer can use. There are many health impact assessment questionnaires available that will help as a guideline for developing an HIA. Meridian Township has created a HIA that can be found in Appendix H of this document.

For more information see the following link:
http://www.who.int/hia/examples/en/

FUNDING

Funding options for Health Impact Assessments appear to be not available for our area. As the popularity of this tool increases, we suspect that funding options will as well.

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

HIA is a process the planner/developer follows to understand the full range of public health impacts of a project. Within zoning regulations, there are various elements of development regulations that support the use of a HIA, including waste management language, setbacks, traffic study requirements, walkability requirements, energy efficiency language, etc.

Meridian Township has implemented HIA into it's Zoning Ordinance. Below is a link to the ordinance:
http://library1.municode.com:80/default-now/template.htm?view=browse&doc_action=setdoc&doc_keytype=tocid&doc_key=74165495ec99112149d23e7032952a14&infobase=13564

CASE STUDIES

Meridian Township., MI
Meridian Township implemented a Health Impact Assessment questionnaire to help aide planners in their community in determining the primary and secondary health impacts of proposed developments. A sample of Meridian Township's HIA can be found in Appendix H.

DISCUSSION

Overall HIA is a good tool for learning where a project or a community stands with various health issues. The assessment allows the planner or developer to quickly see any implications a project may have on a community, as well as how healthy the overall community is and what items should be addressed. Determining whether or not a HIA is necessary for a project is key to its success; if a project is selected that shouldn't be, it could be more time consuming and involve additional studies, however, if a project is not selected that should be, the health of the community could continue to degrade due to the overlook.

GREENING MID-MICHIGAN TOOLKIT: PUBLIC INPUT TOOLS

VOLUNTARY STEWARDSHIP

BACKGROUND

For a green infrastructure vision to be successful, it cannot simply rely on land acquisitions and regulatory measures, but should also focus on implementing a variety of voluntary stewardship programs. The Environmental Protection Agency (EPA) believes that the public can provide valuable input and assistance, and suggests that the public be given opportunities to play an active role in both the development and implementation of programs. An active and involved community is crucial to the success of a green infrastructure program because it allows for (Protecting America's Land Legacy, 2003):

- Broader public support since citizens who participate in the development and decision making process are partially responsible for the program and, therefore, may be less likely to raise legal challenges to the program and more likely to take an active role in its implementation;

- Shorter implementation schedules due to fewer obstacles in the form of public and legal challenges and increased sources in the form of citizen volunteers; and

- A broader base of expertise and economic benefits since the community can be a valuable, and free, intellectual resource

METHODS OF IMPLEMENTATION

Below is a list of programs that a community may consider implementing in order to achieve their green infrastructure goals.

Notification and Recognition

Sometimes, simply notifying landowners of the value of green features and explaining the purpose of a green infrastructure network are sufficient to achieve green infrastructure goals. Owners who are made aware of important natural resources on their properties are often willing to protect them once they learn of their existence or significance. Notification and recognition programs routinely provide property owners with information about conservation goals and efforts.

Awards Programs

Appreciating people who have made an outstanding commitment to conservation is a great way to recognize contributions and inspire others to follow (Meridian Twp Greenspace Plan, 2004). Local awards programs can help bring recognition to landowners to promote stewardship efforts. The awards can also be extended to local businesses for initiating stewardship programs.

Adoption Programs

Adopt-A-Stream programs are being used throughout the United States, including in the Tri-County region. Adopt-A-Stream programs are an excellent public outreach tool for municipalities to involve citizens of all ages and abilities (Adopt-A-Stream Programs, 2008). They are volunteer programs in which participants "adopt" a stream, creek, or river to study, clean up, monitor, protect, and restore. Through these activities, the adopting group or organization becomes the primary caretaker of that stretch of stream in the watershed.

A municipality can tailor an Adopt-A-Stream program to allow participation from any group or organization within a watershed. Adoptions are as flexible and unique as the streams themselves. Adopting a stream is a great program for youth groups, including church groups, scouts, and school clubs, but it can also be a great activity for adult groups, such as neighborhood associations, civic organizations, or businesses. Levels of involvement range from quarterly visual surveys and litter pick-ups to monthly testing to one-time habitat improvement projects. The objective of the program is not only to remove litter, but also to improve the quality of the stream. Waste collected from stream banks and channels could spur local interest in maintaining and improving the water quality and aesthetics of all local water bodies.

Lansing's Adopt-A-Spot program, as part of its Go Green! Go Lansing! Initiative provides an opportunity for the business community and volunteers to play an active role in cleaning, greening and maintaining areas through adoption of a site. Sites for adoption may include rain gardens, flowerbeds, historical markers and other public spaces.

Technical Assistance

The complexity of conservation programs may serve as a disincentive for otherwise interested landowners (Benedict M. A., 2006). Landowners need assistance in identifying programs and funding opportunities, understanding regulations, developing conservation plans, applying for permits, and undertaking best management practices or restoration activities. Simply providing technical assistance to landowners can help facilitate the implementation of green infrastructure. The state of Michigan Department of Natural Resources and Environment has a very good website providing information for citizens and businesses on environmental policies and initiatives.

See the following link for technical information provided by the Michigan DNRE:
http://www.michigan.gov/deq/0,1607,7-135-3585---,00.html

Environmental education

Landowners may be motivated to conserve land and protect the ecosystem but they might need information on how to do so (Benedict M. A., 2006). Education and demonstration programs can help provide landowners with the knowledge and skills they need to manage their property in accordance with green infrastructure network goals. Communities in the Tri-County region can use newsletters to provide a continuing series on environmental issues and related opportunities for homeowners regarding the green infrastructure plan. Schools can offer special community service projects around some aspect of the green infrastructure plan or integrate the plan in a biology or earth science class.

Community Service Days

Local governments and organizations may hold community service activities to increase awareness of green infrastructure issues including:

- River clean-ups
- Storm drain markings
- Wetland plantings
- Reforestation
- Removing invasive species

Residential Conservation

Conservation practices on residential land can help increase food and shelter for birds and other wildlife, control soil erosion, reduce sediment in waterways, conserve water and improve water quality, inspire a stewardship ethic, and beautify the landscape. Eaton County's *Backyard Conservation* shows homeowners how conservation practices that are adapted for use around your home. These practices help the environment and can make their yard more attractive and enjoyable. Most backyard conservation practices are also easy to use. Conservation techniques include:

- Compost
- Wetlands
- Mulching
- Wildlife
- Tree Planting
- Terraces

For more information on Eaton County's Backyard Conservation program, see the following link:
http://www.eatoncounty.org/Departments/ECD/programs/BackyardConservation.htm

FUNDING

- Environmental Finance Centers provide expert advice to local governments that may lack knowledge of funding resources:
  www.epa.gov/efinpage
- EPA Environmental Education Grants
  http://www.epa.gov/Education/grants.html
- Local utility companies are also active member in the community, whether in the form of grant giving or lending a helping hand in local activities:
  - o Lansing Board of Water and light
    http://lbwl.com/communityimpact.asp
  - o Consumers Energy
    http://www.consumersenergy.com/content.aspx?id=1535&sid=110
  - o Detroit Edison
    http://www.dteenergy.com/dteEnergyCompany/environment/conservation/programs.html
- Local charitable organizations
- Private property owners

SAMPLE ORDINANCE LANGUAGE / REGULATORY CONSIDERATIONS

By nature of voluntary stewardship programs, they often do not rely on ordinances or formal government action to facilitate implementation. Instead, it requires the local government to act as a facilitator, allowing community member and local organizations to come together to work towards achieving the regional green infrastructure goals.

CASE STUDIES

The Go Green! Go Lansing! Initiative honors individuals who have gone above and beyond to protect and improve our local environment with their Green Hero Award.
http://www.lansingmi.gov/Lansing/gogreen/Nomination_Form.pdf

Potter Park Zoo Volunteering Opportunities
Potter Park Zoo offers a wide range of volunteering activities throughout the year. Volunteers can adopt a garden or just come at their leisure to help the horticulturist with the gardens on grounds.
http://ingham.org/ppz/volunteer.htm

The Eaton Conservation District website provides a wide variety of information for residents as well as links for upcoming meetings and events:
http://www.eatoncounty.org/Departments/ECD.htm

Michigan Trails and Greenways Alliance is hosting a re-vegetation project along the Lansing River Trail to demonstrate the importance of native vegetation and green infrastructure. MTGA is using Facebook, a free social networking site, to advertise and get feedback on this and other planned events. http://www.facebook.com/pages/Michigan-Trails-and-Greenways-Alliance/250041062758?v=app_2373072738#!/pages/Michigan-Trails-and-Greenways-Alliance/250041062758?v=wall

For an example of voluntary stewardship at the local community level, please refer to Meridian Township's website for local examples of volunteer and sponsorship opportunities at the following link: http://www.meridian.mi.us/index.asp?Type=B_BASIC&SEC={1C9649D4-C316-4488-8FEB-5F4566731E89}

DISCUSSION

Green infrastructure is a long-term strategy, not a matter of buying land and forgetting about it (Benedict). Green infrastructure lands need to upkeep and management just as highway and other forms of infrastructure do. There are many factors that affect the health of land in a green infrastructure network: invasive species, overuse by visitors, water pollution, and so on. What's more, the character and health of land can change over time.

Green infrastructure networks require assessing the status of each component; restoring it if necessary (by planting trees, removing exotic plants, etc.), monitoring its status and the results of management actions, and modifying the original management strategy to maintain desired characteristics.

According to the EPA, the ethic and practice of stewardship requires an information-rich environment. Effective communication of information can impact perspectives, behavior, practices, and decision making. To enable private landowners to manage their land as stewards, information should be available to:

• Inform owners about natural resources and valuable ecological sites and habitats on their property, including the presence of endangered species;

• Inform owners about methods available to protect, enhance, manage, and/or conserve such resources and enhance ecological values on the property;

• Enable owners to find competent advice and technical assistance;

• Enable owners to locate available financial assistance, including cost-sharing programs, low interest loans, grants, etc;

• Inform owners how to form partnerships with governmental agencies and Non-Governmental Organizations;

• Inform owners about how private property can be held, conserved, and transferred to heirs in a stewardship-friendly manner.

Stewardship information must be carefully and purposefully assembled, packaged, targeted, and presented. The delivery of the information must be considered as carefully as the message itself. The usual practice of "getting the word out" needs to be supplemented by "getting the word in". Locally based peer groups and open engagement of neighbors can often be more effective than outside experts.

See the following link for more information on voluntary stewardship:
http://www.epa.gov/efinpage/efab/stewardship_2003.pdf

Social Networking

Greater access to the internet as well as free social networking sites such as Facebook can greatly increase the capacity of voluntary stewardship programs. City departments and neighborhood organizations can quickly and easily organize volunteers and share valuable information about specific programs and events in the area. Social networking sites are also great for gaining feedback about specific programs, increasing efficiency over time.

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APPENDICES

APPENDIX A: TOOL RESOURCES

INTRODUCTION

This appendix contains additional resources for each of the tools listed in the document. Tools are listed in the same order as the document. Each resource link contains a brief summary of the link. These resources are to be used as guides to additional information only.

PARKS & RECREATION RESOURCES

Inter-local Agreement for Recreation

The purpose of this Inter-local Agreement is to facilitate and support varied recreational opportunities principally for the residents of the City of Charlotte, the Township of Eaton, and the Township of Carmel. Resources allocated and/or generated through the establishment of this Agreement will be directed toward, but not limited to, the development and maintenance of facilities, fields, and spaces that enhance recreational and sport offerings.

http://www.carmeltownship.org/carmel_township_website_Novembe/Communications/recreation%20agreement.pdf

URBAN FORESTRY RESOURCES

The Arbor Day Foundation provides direction, technical assistance, public attention, and national recognition for urban and community forestry programs.
http://www.arborday.org/programs/treeCityUSA/index.cfm

The Tree Benefit Calculator allows anyone to make a simple estimation of the benefits individual street-side trees provide.
http://www.treebenefits.com/calculator/

The Conservation Fund's Green Infrastructure Leadership Program was created in 1999 to build the capacity of land conservation professionals and their partners to undertake strategic conservation activities that are proactive, systematic, well integrated and applied at multiple scales.
http://www.greeninfrastructure.net/

Tools for assessing and management: http://www.itreetools.org
http://www.americanforests.org

Indiana's statewide street tree benefits report completed in 2008:
http://www.in.gov/dnr/forestry/files/Fo-INUrbanForestBenefits709.pdf

City of Pittsburgh, Pennsylvania urban forestry program:
http://www.city.pittsburgh.pa.us/pw/html/forestry.html

National Urban and Community Forestry Advisory Council List of projects partially funded by the NUCFAC since 1993:
http://www.urbanforestrysouth.org/research/nucfac

LOW IMPACT DEVELOPMENT (LID) RESOURCES

The EPA has created a short document for guiding communities to low impact development. The link below provides a PDF of the document explaining funding options, methods, etc.
http://www.epa.gov/ne/npdes/stormwater/assets/pdfs/IncorporatingLID.pdf

The link below is to a website where low impact development information can be found. Information on the various types of low impact development can be found here.
http://www.lowimpactdevelopment.org/lidphase2/

The link below provides information to bio-retention and stormwater research from A. James Clark School of Engineering. The website discusses pros and cons of bio-retention.
http://www.ence.umd.edu/~apdavis/Bioret.htm

The link below is to a website where low impact development information can be found. Information on the various types of low impact development can be found here.
http://www.lowimpactdevelopment.org/links.htm

The link below is to a website where low impact development information can be found. Information on the various types of low impact development can be found here.
http://www.lid-stormwater.net

The link below is to a website where low impact development information can be found. Information on the various types of low impact development can be found here.
http://www.epa.gov/nps/lid/

Native Vegetation Information:
http://www.a2gov.org/government/publicservices/fieldoperations/NAP/NativePlants/Pages/NativePlants.aspx

Soils Information:
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Green Roof Information:
http://www.greenrooftops.org/studies.htm
http://www.greenroofs.com/

Pervious Pavements:
http://www.perviouspavement.org/

GREEN BUILDING RESOURCES

Energy Star
http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std_adp.php?p_faqid=4908

USGBC LEED Resources
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=75

HISTORIC PRESERVATION RESOURCES

Michigan's State Historic Preservation Office:
http://www.michigan.gov/mshda/0,1607,7-141-54317-53069--,00.html

How to register for Historic Places in MI:
http://www.michigan.gov/mshda/0,1607,7-141-54317_54370_20845---,00.html

The Michigan Main Street Center brochure:
http://www.michiganmainstreetcenter.com/LinkClick.aspx?fileticket=m_uX02_izhg%3d&tabid=67

Funding for the Historic Preservation Fund:
http://www.michigan.gov/mshda/0,1607,7-141-54317_18873-54145--,00.html

Historic preservation tax incentives from the National Park Service:
http://www.nps.gov/hps/tps/tax/easement.htm

Federal and State historic preservation grants, tax incentives, tax credits, and local government programs, from the Michigan State Housing Development Authority:
http://www.michigan.gov/mshda/0,1607,7-141-54317_18873---,00.html

Executive Summary of Old Town Lansing Market Study and Strategies:
http://www.iloveoldtown.org/images/uploads/OldTown_ExecSummary.pdf

History and restoration efforts of the Grand Ledge Area Historical Society:
http://www.gdledgehistsoc.org/community-opera.html

James Beal Botanical Garden:
http://www.mcgi.state.mi.us/hso/hsmatchname.asp?hsn=Beal+Botanical+garden&hss=0

Michigan Department of Natural Resources and Environment (DNRE):
http://www.michigan.gov/dnr/0,1607,7-153-54463_19313_20652_19271_19357-159402--,00.html

Michigan's Local Historic Districts Act:
http://www.michigan.gov/documents/hal_mhc_shpo_LHDManual_07LocalOrdinance_161862_7.pdf

Whole Building Design Guide Historic Preservation Article:
http://www.wbdg.org/design/historic_pres.php

BROWNFIELD RECLAMATION RESOURCES

An Assessment of Brownfield Redevelopment Policies:
http://www.businessofgovernment.org/pdfs/Hula.pdf

State Policies for Shaping Healthy, Active Communities:
http://www.nga.org/Files/pdf/05ActiveLivingIssueBrief.pdf

US Department of Housing and Urban Development: Brownfields Economic Development Initiative:
http://www.hud.gov/offices/cpd/economicdevelopment/programs/bedi/index.cfm

Advancing Linkages Between Brownfields Redevelopment and Greenfields Protection in Michigan:
http://www.glc.org/announce/03/MichiganRoundtableProceedings.pdf

INFILL DEVELOPMENT RESOURCES

Michigan Land Use Leadership Council Executive Summary:
http://www.michiganlanduse.org/exec_summary.pdf

Additional Online Link to New Urbanism:
http://www.kzoo.edu/convene/clearinghouse/new%20urbanism.htm

Community Choices for Infill Development:
http://www.oki.org/landuse/pdf/OKIInfill.pdf

Infill Development Strategies for Shaping Livable Neighborhoods:
www.mrsc.org/publications/infill1.pdf

Oregon Infill and Development Code Handbook:
www.oregon.gov/LCD/docs/publications/infilldevcode.pdf

Additional Online Link to Infill Development:
http://www.kzoo.edu/convene/clearinghouse/Infill%20development.htm

Infill Development Strategies for Shaping Livable Neighborhoods:
http://www.mrsc.org/publications/textfill.aspx

TRAILS AND NON-MOTORIZED PATHWAY RESOURCES

List of current trails for each county in Michigan
http://www.michigantrails.us

Ingham County Trails
http://www.ingham.org/pk/Trails/Heart_MichIngham%203-3-2008_Nophoto.pdf

A list of each Michigan County with a safe-route-to-school map
http://www.michigantrails.org/projects/safe-routes-to-school-2/

A list of schools in Michigan that participate in the Safe Route to Schools Program
http://www.saferoutesmichigan.org/schools.htm

Trails for Health: Promoting Health Lifestyles & Environments, U.S. Department of Health and Human Services
A two page printable brochure from the U.S. Department of Health and Human Services touches on physical health and how it is critical to promote trails for the benefit of the community. There is a section describing how seniors benefit the most out of any other group. A quick read that can be distributed throughout any community.
http://atfiles.org/files/pdf/TrailsHealth.pdf

Active Transportation for America
A report compiled by the Trails-to-Trails Conservancy and Bikes Belong Coalition in 2008 that looks at the increased investment in bicycling and walking infrastructure. This report "evaluates benefits in the areas of transportation, oil dependence, climate change, and public health, and puts dollar estimates to the economic value of these benefits." This report does no discourage automobile transportation networks and development but instead evaluates how both systems can exists to provide residents other transportation methods that are cost effective and environmentally sound. Case studies are drawn up from Eugene-Springfield, OR (pg 19), New Orleans, LA (pg 25), Camden, NJ (pg 35), and Minneapolis, MN (pg 41).
http://www.railstotrails.org/resources/documents/whatwedo/atfa/ATFA_20081020.pdf

Interactive map of the Lansing River Trail, example of an open-multi use trail:
https://www.msu.edu/~paszkie1/RiverTrail/index.html

Huron-Manistee National Forest example of an off-road vehicle map:
http://www.fs.fed.us/r9/hmnf/pages/Recreation/mvum.htm

Meridian Township Brattin Woods Nature Trail, example of a foot trail:
http://www.meridian.mi.us/index.asp?Type=B_BASIC&SEC={6D2C59ED-1071-4B8C-BA04-8C2264EFE31A}

Charter Township of Orion, Oakland County, MI example of safety path:
http://www.orion.lib.mi.us/township/safetypaths/spmap.html

Michigan State University Campus map, example of bike lane or paved shoulder:
http://www.bikes.msu.edu/img/pdf/MSUBikes-brochure-back-map.pdf

Kalamazoo Watershed Heritage Water Trail, example of a water trail:
https://www.wmich.edu/glcms/watertrails/kzotrails_1.htm

Michigan Department of Natural Resources and Environment: Definition of Trails and Pathways. Includes biking, mountain biking, off-road vehicle trails/routes/areas, cross country skiing, equestrian trails, etc.:
http://www.michigan.gov/dnr/0,1607,7-153-10365_16839-43943--,00.html

The Greenway Collaborative, Inc.: A list of local, regional, and statewide projects involving trail and non-motorized pathway and green space plans:
http://www.greenwaycollab.com/projects.htm

City of Lansing 2020 Non-Motorized Plan:
Http://www.midmeac.org/files/2020LansingWalkandBikePlan1.22.08.pdf

Walkability Checklist 1:
http://www.nhtsa.dot.gov/people/injury/pedbimot/ped/walk1.html

Walkability Checklist 2:
http://drusilla.hsrc.unc.edu/cms/downloads/walkablity_checklist.pdf

Oakland County, MI Walkability Checklist:
http://www.oakgov.com/peds/assets/docs/es_docs/tr_checklist2.pdf

Healthy Community Toolkit:
http://www.michigan.gov/documents/HealthyCommunitiesToolKit_Web_168570_7.pdf

County Level Trails Master Plan: Macomb County:
http://www.macombcountymi.gov/mcped/Documents/Planning/Macomb%20County%20Trailways%20Master%20Plan.pdf

Individual Trail Level Master Plan: Clinton River Trail:
http://www.greenwaycollab.com/images/CRTMP/Clinton%20River%20Trail%20Low%20Res%20Final%20Master%20Plan.pdf

Other toolkits can be found on the Michigan Trails and Greenway Alliance and at American Trails:
http://library.michigantrails.org/index/ / http://www.americantrails.org/resources/funding/index.html

WILDLIFE CORRIDOR RESOURCES

Michigan Natural Features Inventory's report of ecological information in the Tri-County region:
http://www.greenmidmichigan.org/Publications/Significant%20Natural%20Features%20in%20the%20Tri-County%20Region.pdf

USDA briefing on wildlife corridors and criteria for their design:
http://www.nrcs.usda.gov/new_csp/animal_pdfs/ANM19_Wildlife_Corridors.pdf

Penn State University explanation of wildlife corridors:
http://www.rps.psu.edu/probing/wildlifecorridors.html

PURCHASE OF DEVEOLPMENT RIGHTS (PDR) RESOURCES

Farmland Preservation Informational Resources:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-11788--,00.html

State of Michigan describe funding of Farmland Preservation Programs:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-11739--,00.html

Enrolling in the Farmland Preservation Programs:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-14027--,00.html

Changing an existing Farmland Development Rights Agreement:
http://www.michigan.gov/documents/MDA_Releasing_Land_132546_7.html

Early Termination of All or Part of a Farmland Development Rights Agreement:
http://www.michigan.gov/images/PA_116_MAP_132463_7.jpg

Map of Enrolled Farmland in preservation program 2005:
http://www.legislature.mi.gov/%28S%28pl52la45neafsdn0krg5otaf%29%29/mileg.aspx?page=GetObject&objectname=mcl-324-36101

Definitions in legislature about Farmland Preservation:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-10301--,00.html

5 methods for preserving Farmland:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-146458--,00.html

Conservation Easement Donation Brochure:
http://www.accesskent.com/YourGovernment/BOC/PDR/history_of_kent_PDR.htm

PDR history in Kent County:
http://www.plannersweb.com/wfiles/w140.html

Intro article about what PDR is used for:
http://wi-ei.org/uploads/media/Understanding_Purchase_Transfer_Dev_Rights.pdf

Information containing pros and cons of PDR:
http://www.ewashtenaw.org/government/departments/planning_environment/planning/farmland/

Washtenaw County PDR Program with applications and related links:
http://www.michigan.gov/documents/mda/3Oct08CsvtnEsmnt_258940_7.pdf

Map of Conservation Easements throughout Michigan as of October 2008:
http://www.michigan.gov/documents/PA_116_Eligibility_Requirements_36532_7.pdf

Farmland and Open Space Preservation Program eligibility requirements. Part 361 of the Natural Resources and Environmental Protection Act, 1994 Act 451 as amended, more commonly known as PA 116:
http://www.michigan.gov/documents/mda/MDA_FarmlandLocalGov_183092_7.pdf

Instructions for Local Governing Body for completing an application for a farmland agreement (FORM ES-013):
http://www.michigan.gov/documents/MDA_PA_116_Agreements_132643_7.pdf

Brochure for farmland and open space preservation program through the State of Michigan:
http://www.michigan.gov/documents/MDA_PDR_QUALIFICATION__FORM_123020_7.pdf

The Agricultural Preservation Fund Board has adopted an application process, scoring system, and standards and guidelines for funding local PDR programs. In order to apply for grants from the Board, a local program must be qualified by the Michigan Department of Agriculture. To become qualified, you must send the required program elements to the MDA for Review. Click to view:
http://www.michigan.gov/documents/MDA_REVMAPFBApplicationProcess_117312_7.pdf

The Michigan Agriculture Preservation Fund is a fund established for the purpose of providing grants to local qualifying entities to assist in the purchase of development rights of farmland. Click to view the Michigan Agricultural Preservation Fund Board Application Process and Scoring System:
http://www.michigan.gov/documents/MDA_DonationFarmlandEasement_164017_7.pdf

Example of a basic farmland development rights easement held by the state:
http://www.michigan.gov/documents/PA_116_Application_Form_36531_7.pdf

Application for Farmland Agreement. Part 361 of the Natural Resources and Environmental Protection Act, 1994 Act 451 as amended, more commonly known as P.A. 116. Please read the Requirements and instructions before filling out this form:
http://www.senate.michigan.gov/sfa/Publications/Issues/MichiganFarmland/MichiganFarmland.pdf

Preserving Michigan Farmland through Purchase of Development Rights from the Michigan Senate:
http://www.accesskent.com/YourGovernment/BOC/PDR/pdfs/PDR_Ordinance_Adopted.pdf

Example of PDR in Kent County- Ordinance Language:
http://www.accesskent.com/YourGovernment/BOC/PDR/pdfs/PDR_Application2009.pdf

TRANSFER OF DEVELOPMENT RIGHTS (TDR) RESOURCES

TDR in D.C.'s real estate market:
http://www.bizjournals.com/washington/stories/2007/08/20/focus9.html

Cases, Statutes, examples, and a model:
http://ciremagazine.com/article.php?article_id=915

Factsheet about TDR from Ohio State University:
http://ohioline.osu.edu/cd-fact/1264.html

TDR Programs. Using the Market for Compensation and Preservation. Cornell University:
http://government.cce.cornell.edu/doc/html/Transfer%20of%20Development%20Rights%20Programs.htm

King County, Washington Case Study:
http://www.kingcounty.gov/environment/stewardship/sustainable-building/transfer-development-rights.aspx

Boulder, CO Case Study:
http://www.bouldercounty.org/lu/planning_division/tdr_program/

Colorado, Case Study:
http://www.sprawlaction.org/halloffame/IBluebasin.html

Introduces one of the greatest difficulties of TDR programs, insufficient demand. A simple model and estimate of TDR demand function from Calvert County, Maryland. Baseline zoning is a critical determinant of TDR demand:
http://www.rff.org/documents/RFF-DP-05-45.pdf

TDR in U.S. Communities. Evaluating Program Design, Implementation, and Outcomes:
http://www.rff.org/RFF/Documents/Walls_McConnell_Sep_07_TDR_Report.pdf

Talks about legal issues of TDR, best practices in the New York area, and Findings:
http://www.rpa.org/pdf/transferdevelopment.pdf

Provides Benefits and Drawbacks of PDR and TDR:
http://wi-ei.org/uploads/media/Understanding_Purchase_Transfer_Dev_Rights.pdf

Talks about PDR, Ag Preservation, and other land use policy tools (TDR) in Pennsylvania and their experiences with the programs. An 11 page document (pg. 9-11) contains information about a Pennsylvania Township and the establishment of their TDR bank:
http://ageconsearch.umn.edu/bitstream/17934/1/ar980034.pdf

American Farmland Trust Fact Sheet about TDR:
http://www.farmlandinfo.org/documents/27746/FS_TDR_1-01.pdf

Municipal Research and Services Center of Washington:
http://www.mrsc.org/subjects/planning/farmland.aspx

WATERSHED PLANNING RESOURCES

Map of Michigan's Major Watersheds:
http://www.michigan.gov/documents/deq/lwm-mi-watersheds_202767_7.pdf

Principles of Watershed Management:
http://www.epa.gov/watertrain/watershedmgt/index.html

Watershed Plan Builder:
http://iaspub.epa.gov/watershedplan/planBuilder.do?pageId=51&navId39&sessionActive=true

8 Tools of Watershed Protection:
http://www.epa.gov/watertrain/protection/index.html

Agricultural Management Practices for Water Quality Protection:
http://www.epa.gov/watertrain/agmodule/

Forestry Best Management Practices in Watersheds:
http://www.epa.gov/watertrain/forestry/

Draft Proposal of Sustainable Watershed Planning Act:
http://documents.clubexpress.com/documents.ashx?key=s3v%2FMmLK66ue87lYMjA7RkpEHPT%2BPflO
lSo%2FdSTFtDWKFQHa%2Bs1dVzeAurR%2Fyi4Z%2BQiIdwJN6IxUkflbW2Z%2BlNpAQirZZv5E

EPA Catalog of Federal Funding Sources for Watershed Protection:
http://cfpub.epa.gov/fedfund/

Upper Looking Glass Watershed Plan:
http://www.michigan.gov/documents/deq/wb-nps-upperlookingglass-wmp_284715_7.pdf

Carrier Creek Restoration Project:
http://www.michigan.gov/documents/deq/ess-nps-carrier-creek_208665_7.pdf

2003 Upper Grand River Management Plan:
http://www.michigan.gov/documents/deq/ess-nps-wmp-upper-grand_208998_7.pdf

Upper Grand River Watershed Management Plan Transition:
http://www.michigan.gov/documents/deq/ess-nps-fs-upper-grand-planning_207977_7.pdf

Article 4 of the Wetlands & Watersheds Article Series: "A Local Ordinance to Protect Wetland
Functions":
http://www.cwp.org/Resource_Library/Model_Ordinances/index.htm

Post-Construction Stormwater Model Ordinance:
http://www.cwp.org/Resource_Library/Center_Docs/SW/pcguidance/Tool3.pdf

Center for Watershed Protection:
http://www.cwp.org/Resource_Library/Watershed_Management/planning.htm

Principles of Watershed Management Module:
http://www.epa.gov/watertrain/watershedmgt/principle1c.html

CONSERVATION EASEMENT RESOURCES

Department of Agriculture Conservation Easement Donation Brochure:
http://www.michigan.gov/mda/0,1607,7-125-1567_1599_2558-146458--,00.html

 PCA Assessment for the Tri-County Region:
http://www.tri-co.org/TRANSPORTATION%20PLANNING/Potential%20Conservation%20Area%20Assessment.pdf

Conservation Easement Check List:
http://www.michigan.gov/documents/deq/lwm-wetlands-conservationeasementchecklist_263028_7.pdf

The Conservation Easement Landowner Questionnaire:
http://www.michigan.gov/documents/MDA_PDR_Questionaire_164131_7.pdf

Conservation districts across Michigan:
http://www.macd.org/local_districts.html

Conservation District Training Module:
http://www.macd.org/district_resources.html

Tax regulations related to conservation easements:
http://www.landtrustalliance.org/policy/taxincentives/fed-tax-regs

Easement incentives from the Land Trust Alliance:
http://www.landtrustalliance.org/policy/taxincentives/federal/incentive-info

Rogue River Conservation Easement Project:
http://www.michigan.gov/documents/deq/ess-nps-RogueConservationEasement-fs_229400_7.pdf

Agreement for Conservation Easement document:
http://www.michigan.gov/documents/deq/lwm-wetlands-conservationeasements_263027_7.pdf

Conservation easement application for Michigan open space properties:
http://www.michigan.gov/documents/MDA_ConservationEasement_164018_7.pdf

Map of the donated conservation easements in Michigan as of December 2008:
http://www.michigan.gov/documents/mda/2Oct08DntdCsvtnEsmnts_258938_7.pdf

Application for a designated open space easement from the Michigan Department of Agriculture and Farmland and Open Space Preservation Program:
http://www.michigan.gov/documents/mda_DOSE_Application_Form_51765_7.pdf

The Nature Conservancy Conservation Easement Document:
http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeaseme nts/files/consrvtn_easemnt_sngle72.pdf

URBAN AGRICULTURE / COMMUNITY GARDENING RESOURCES

Below are some links that can help give insight to urban agriculture and community gardening:
How to start a community garden:
http://celosangeles.ucdavis.edu/garden/articles/startup_guide.hml

Help write letters to in supporting of your community garden:
http://www.communitygarden.org/take-action/

Food security:
http://www.foodsecurity.org/resource_list.html#urbanag

The sample ordinance below is from Flint, Michigan. It serves as an example of how an outdated ordinance would provide challenges for regulation in urban agriculture. The following link provides a few specific zoning languages:
http://www.thelandbank.org/downloads/Urban_Food_Gardening_Report.pdf

For more information on The Greening of Detroit Program click on the following link:
http://www.greeningofdetroit.com/3_5_gallery.php?link_id=1195052335

Urban Agriculture and Community Food Security in the United States:
http://www.foodsecurity.org/PrimerCFSCUAC.pdf

American Community Garden Association:
http://www.communitygarden.org/about-acga/

RURAL AGRIBUSINESS RESOURCES

Agriculturally Speaking… Michigan's Agri-business sector on the grow by Don Koivisto, Director, Michigan Department of Agriculture. Click below for more information:
http://www.michigan.gov/mda/0,1607,7-125-1572_28248-206699--,00.html

Michigan's Agri-Food Industry in 2008. A report from the Michigan Department of Agriculture recapping the previous year and the agribusiness sector highlighting key facts:
http://www.michigan.gov/documents/mda/EconRepo_261313_7.pdf

Michigan Food & Farming Systems- MIFFS. Below is a tool section containing links to valuable resources for farmers interested in sustainable production, marketing, value chains, alternative energy and more:
http://www.miffs.org/tools.asp

Michigan Food & Farming Systems- resources for consumers. This site provides some resources for consumers looking for local food or more information about sustainable agriculture:
http://www.miffs.org/consumers.asp

Michigan Food & Farming Systems- resources for farmers. This site provides resources for growers looking for helpful hints on marketing and selling products:
http://www.miffs.org/farmers.asp

Agriculturally Speaking… Preserving the future of Michigan's Farmland by Don Koivisto, Director, Michigan Department of Agriculture. Click below for more information:
http://www.michigan.gov/mda/0,1607,7-125-1572_28248-202601--,00.html

Webster Dictionary Definition of agribusiness:
http://www.merriam-webster.com/dictionary/agribusiness

State of Michigan Federal and State Agriculture Departments Financial Assistance Programs available.
http://www.michigan.gov/mda/0,1607,7-125-1568_51684-202071--,00.html

HEALTH IMPACT ASSESSMENT RESOURCES

World Health Organization:
http://www.who.int/hia/examples/en/

The Center for Disease Control (CDC) has also created a similar guide for implementing a HIA. See the following link for more information:
http://www.cdc.gov/healthyplaces/publications/Health_Impact_Assessment2.pdf

VOLUNTARY STEWARDSHIP RESOURCES

The Clean Michigan Initiative (CMI) is a $675 million bond approved by Michigan voters on November 3, 1998 to improve and protect Michigan's water resources.
http://www.michigan.gov/deq/0,1607,7-135-3307_31116---,00.html

 Meridian Township Greenspace Plan. Refer to page 43:
http://www.greenmidmichigan.org/Publications/Meridian%20twp/Green%20space%20plan%20final%20report.pdf

Environmental Finance Centers provide expert advice to local governments that may lack knowledge of funding resources.
 www.epa.gov/efinpage

EPA explanation of Adopt-A-Stream and Adopt-A-Watershed programs:
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=20&minmeasure=2

EPA recommendations for the need for voluntary stewardship programs:
http://www.epa.gov/efinpage/efab/stewardship_2003.pdf

APPENDIX B: RAIN GARDEN INFORMATION

RAIN GARDEN MAINTENANCE PLAN

Defect or Problem	Condition When Maintenance is Needed	Recommended maintenance to Correct Problem
Wilted Leaves or Drooping Plants	Drought or lack of sufficient storm water/infrequent rain events.	Watering on a weekly or bi-weekly basis. Soak plants with at least an inch of water. This is most critical in the first year when the plants are developing deep root systems.
Sediment Accumulation on Vegetation	Sediment depth exceeds 2-inches in areas of rain garden vegetation.	Remove sediment deposits on vegetation treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet.
Excess Standing Water	When water stands in the swale for longer than 3 days between storm events and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add under drains or convert to a wet bio-filtration swale.
Poor Vegetation Coverage	When vegetation is sparse or bare or eroded patches occur in more than 10% of the swale bottom.	Determine why vegetation growth is poor and correct that condition, or contact a qualified Horticulturalist or Rain Garden Designer. If near a roadside or parking lot, check for salt accumulation in the rain garden soils.
Invading Vegetation	When nuisance weeds and other vegetation start to take over.	Remove nuisance vegetation so that flow is not impeded and native plants are not crowded out. Check for weeds on a monthly basis, remove as necessary. Take care not to pull desirable native plant species.
Mulch Layer Thin or Missing	Mulch layer washes off, decomposes, or gets mixed into soil.	Inspect for areas of thin mulch in the Spring and Fall. Add additional clean, shredded hardwood mulch in areas where mulch is less than 3-inches thick, take care not to cover the base of the rain garden plantings. Covering the plant stalks with mulch will cause the plants to rot and die.
Excessive Shading	Vegetation growth is poor because sunlight does not reach swale.	If possible, trim back over-hanging limbs, remove brushy vegetation on adjacent slopes. If levels of sunlight are less than expected in the design, more shade-tolerant species may be necessary.
Inlet or Outlet Clogged	Inlet/outlet areas clogged with sediment and/or debris.	Remove material so that there is no clogging or blockage in the inlet and outlet areas.
Trash and Debris Accumulation	Trash and debris accumulates in the low areas of the rain garden.	
Erosion and/or Scouring	Eroded or scoured rain garden bottom due to flow channelization, or higher than expected flows.	

APPENDIX C: MICHIGAN NATIVE PLANT PRODUCERS

Michigan Native Plant Producers Association
Sources for Michigan native plants and seeds

MNPPA CERTIFIED

Member List

American Roots
Trish A. Hacker Hennig
1958 Hidden Lake Trail
Ortonville, MI 48462
Phone: 248 627-8525 or 248 882-7768
Fax: 248 627-3865
Email: americanrootsnat@aol.com
Wildflowers and native plants, many of Oakland County genotype.

Borealis Seed Company
Suzanna Rabitaille and Judy Keast
529 W. Bluff St.
Marquette, MI 49855
Phone: 906 226-8507 office, 906 345-9636 nursery
Email: srborealis@peoplepc.com, judykeast@peoplepc.com
Specializing in Upper Peninsula wildflower and grass genotypes; seed, plugs, and native-plant consultation.

Hidden Savanna Nursery
Chad Hughson
18 N. Van Kal St.
Kalamazoo, MI 49009
Phone: 269 352-3876
Email: info@hiddensavanna.com
Website: www.hiddensavanna.com
Michigan native wildflowers, grasses, and shrubs sold in containers and plugs. Specializing in Southwest Michigan genotypes.

Mary Ann's Michigan Trees & Shrubs
Mary Ann Menck
28092 M-40 Hwy.
Paw Paw, MI 49079
Phone: 269 628-2474
Email: mamenck@mei.net
Website: www.maryannstrees.com
Michigan trees and shrubs.

Michigan Wildflower Farm
Esther Durnwald
11770 Cutler Rd.
Portland, MI 48875-9452
Phone: 517 647-6010
Fax: 517 647-6072
Email: wildflowers@voyager.net
Website: www.michiganwildflowerfarm.com
Michigan native wildflower and grass seed, consultation, installation, and maintenance.

Native Connections
Jerry Stewart
17080 Hoshel Rd.
Three Rivers, MI 49093
Phone: 269 580-4765
Fax: 269 273-1367
Email: jerry@nativeconnections.net
Web: www.nativeconnections.net
Michigan genotype grass seed, design, consultation, installaton, and management.

The Native Plant Nursery LLC
Greg Vaclavek
P.O. Box 7841
Ann Arbor, MI 48107
Phone: 734 677-3260
Fax: 734 677-5860
Email: plants@nativeplant.com
Website: www.nativeplant.com
Native plants and seeds, consulting, design, and installation.

Oakland Wildflower Farm
Ruth Vrbensky and Richard Dobies
520 N. Hurd Rd.
Ortonville, MI 48462-9419
Phone: 248 969-6904
Email: oaklandwildflowerfarm@gmail.com
Website: www.oaklandwildflowerfarm.com
Michigan native forbs and grasses—specializing in Southeast Michigan genotypes.

Sandhill Farm
Cheryl Tolley
11250 10 Mile Rd.
Rockford, MI 49341-7954
Phone: 616 691-8214
Fax: 616 691-7872
Email: cherylt@iserv.net
Michigan native woodland and wetland forbs and grasses. Consultation and design.

Wetlands Nursery, Inc.
Jewel Richardson
P.O. Box 14553
Saginaw, MI 48601
Phone: 989 752-3492
Fax: 989 752-3096
Email: jewel-richardson@peoplepc.com
Michigan native aquatic and wetland seeds, consulting, and installation.

WILDTYPE Design, Native Plants & Seed LTD
Bill Schneider
900 N. Every Rd.
Mason, MI 48854
Phone: 517 244-1140
Fax: 517 244-1142
Email: wildtype@msu.edu
Website: www.wildtypeplants.com
Native trees, shrubs, wildflowers, and grasses: plugs and small containers. Design, planning, and management of native landscapes.

Growing Michigan's Natural Heritage

03/02/2009

APPENDIX D: EXAMPLES OF MICHIGAN TRAILS

The link provided next to each will display an image or a website that covers local examples of the specific trail type. *The author could not locate any public off-road trails in the Tri-County region		
Trail Type	Example	Link
Open multi-use trails	Lansing River Walk	https://www.msu.edu/~paszkie1/River Trail/index.html
Trail (off-road)	Manistee National Forest (MI)	http://www.fs.fed.us/r9/hmnf/pages/Recreation/mvum.htm
Foot Trail	Okemos/Haslett	http://www.meridian.mi.us/index.asp?Type=B_BASIC&SEC={6D2C59ED-1071-4B8C-BA04-8C2264EFE31A}
Safety (side path)	Oakland Co.	http://www.orion.lib.mi.us/township/safetypaths/spmap.html
Bike Lane or Paved Shoulder	MSU Campus	http://www.bikes.msu.edu/img/pdf/MSUBikes-brochure-back-map.pdf
Water Trail	Kalamazoo Watershed Heritage Water Trail	https://www.wmich.edu/glcms/watertrails/kzotrails_1.htm

APPENDIX E: CURRENT TRAILS IN TRI-COUNTY

Here is a list of current trails for each county provided by http://www.michigantrails.us		
County	List of County Trails Link	Map Link
Clinton	http://www.michigantrails.us/clinton-county-michigan/clinton-county-michigan-trails.html	http://www.michigantrails.org/map/
Eaton	http://www.michigantrails.us/eaton-county-michigan/eaton-county-michigan-trails.html	http://www.michigantrails.org/map/
Ingham	http://www.michigantrails.us/ingham-county-michigan/ingham-county-michigan-trails.html	http://www.ingham.org/pk/Trails/Heart_MichIngham%203-3-2008_Nophoto.pdf

APPENDIX F: CITY OF TROY TRAIL AGENDA

City of Troy Pathways Master Plan
Revised Schedule
4/1/2009

- ■ Work primarily accomplished by HAA
- ■ Work primarily accomplished by TGC
- ■ Work equally shared by HAA and TGC
- ⬭ Meeting/ Milestone

		March	April	May	June	July	August
TASK 1:	**PRE-DESIGN MEETING**						
	In-house set-up						
25-Mar	Pre-Design Meeting						
	Review Existing Documents						
	List of Needs						
	Project Schedule						
TASK 2:	**INVENTORY AND ANALYSIS**						
	Base Map Preparation						
	Site Visits						
	Site Research						
	Site Analysis drawings (Coordination)						
	• Destination analysis						
	• Bike route analysis						
	• Primary street segment analysis						
	• Bike lane analysis						
	• Supplemental analysis						
	• Off-road Trail Analysis						
TASK 3:	**PROGRAMMING AND STRATEGIC APPROACH:**						
9-Apr	City of Troy Meetings-day long session						
14-Apr	Public Meeting-evening long session						
	Informal meetings and phone conversations						
	Preliminary Program (Coordination)						
	• Narrative outlining goals, program & strategy alternatives						
	• Bike Route and bike Boulevard Preliminary Routes						
	• Off-Road Trail Preliminary Routes						
	• Complete Street Recommendations						
	• Trail amenities						
	Preliminary Strategic Plan (Coordination)						
	• Prioritizaton Matrix						
	• General Cost Opinions						
	• Phased Capital Program						
	• Operating Costs						
	• Acquisition Needs						
	HAA Design Review						
TASK 4:	**REVIEW AND REVISIONS**						
	Review Workshop						
	Design Revisions						
	Follow-up Meeting						
TASK 5:	**FINAL MASTER PLAN**						
	Final Document Draft (Coordination)						
	• Description of planning process						
	• Assessment of opportunities and constraints						
	• Goals and objectives/ strategies for action						
	• Phasing narrative						
	• Cost estimates for development						
	• Phased Capital program						
	• Management/ maintenance recommendations						
	• Cost estimates for operations and maintenance						
	• Performance evaluation tools to measure success						
	Final Review Meeting						
	In-house review						
	Final Pathways Master Plan (revisions and print coordination)						
	Final Presentation Meeting						

APPENDIX G: MACOMB COUNTY TRAILWAYS MASTER PLAN

Department: Macomb County Department of Planning and Economic Development and the Macomb County Planning Commission.
Adopted by Macomb County Board of Commissioners: November 2004
Funding: Michigan Department of Transportation (MDOT) and Macomb County Board of Commissioners
The purpose of the Macomb County Trailways Master Plan is "to capture the momentum of existing trail projects and work closely with local, regional, and state agencies to develop a plan that presents a unified and coordinated vision for non-motorized transportation planning and development in Macomb County." (pg 5) Five sections are included in this document and include; Purpose & Process, Existing Systems, Preferred Corridors, Design Considerations, and Implementation Strategy. This case study will outline the content of each section. Further inquires can be found online at

http://www.macombcountymi.gov/MCPED/Documents/Planning/Macomb%20County%20Trailways%20Master%20Plan.pdf.

Purpose & Process: Pages 5-11
This section contains the vision and project overview that the document will achieve. Identified are the agencies who will be directly working on this document, the planning process, and the benefits of trailways. Agencies include townships of the county, MDOT, draining board, municipalities, bordering counties, and public participants. The planning process is shown below. Benefits include; recreation, alternative transportation, conservation and water quality, health, economic, outdoor education, quality of life, smart growth, safe routes to school, and Michigan's Cool Cities Initiative.
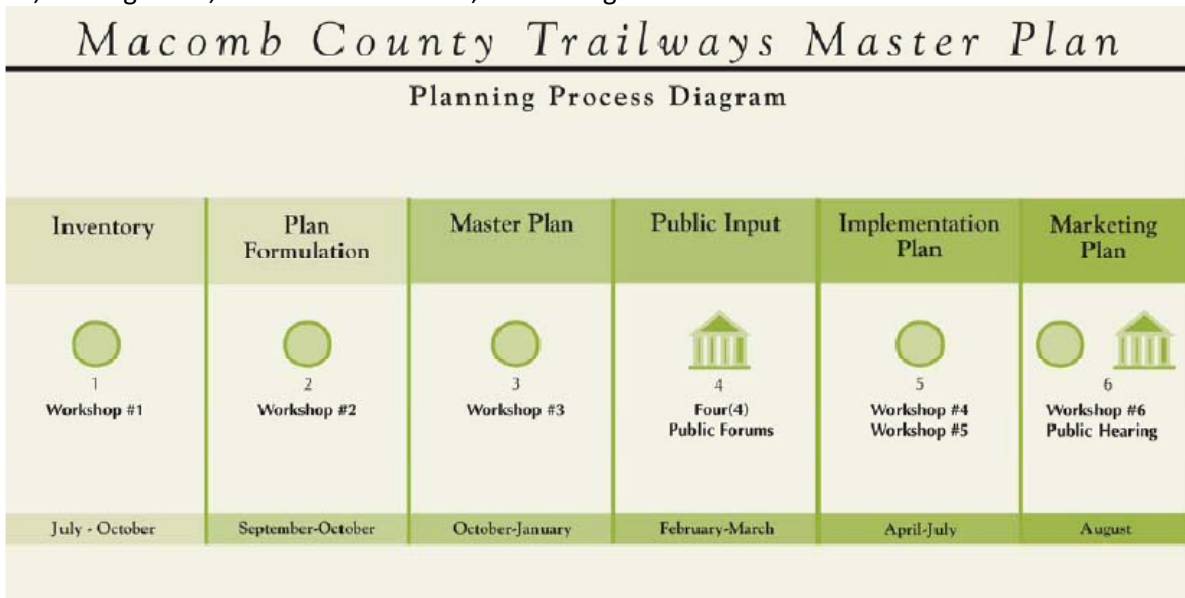
Existing Systems: Pages 13-23
Before funding was secured Macomb County conducted a study of existing trailways, environmental features, and social institutions through regular based meetings, county GIS data, and public review. The next two pages display digital images of base maps and photos.
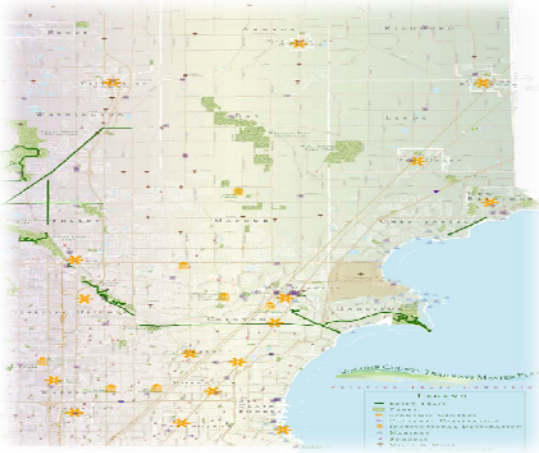
FIGURE 28:   FIGURE 29

Identified next are associated planning efforts in the region and surrounding counties. This is to ensure that existing systems will be connecting to any proposed efforts of future developments. Under each sub category a description is given of the agency or project. Maps are included of regional trail networks which includes surrounding counties.

Preferred Corridors: Pages 25-52

This portion of the master plan discusses that the corridors identified as preferred are not static because of future implications such as property rights, soil conditions, public opinion, land use and many others. Over time more information will be gathered to determine the best location for a trailway network. Instead this study located the best possible routes using GIS data and community input. This is a guideline for local communities to use when connecting trails to "significant natural resources, parkland, commercial centers, institutions, neighborhoods and schools, as well as routes that prove connections into non-motorized systems that exist or are being planned in adjacent counties." pg26

Routes are classified into four subcategories; regional corridors, county connectors, local connectors, and blue water trails along with staging areas (parking and restrooms). (See table below for description of classifications)

Classification	Description
Regional Corridor	"Primary routes and corridors that connect into planned and/or built systems in adjacent counties as well as provide access to major regional destinations" pg 26
County Connectors	"Routes that provide significant connections into the larger regional system and continuously traverse a considerable portion of the County in all directions." pg 26
Classification	Description
Local Connectors	"Segments within the system that lead from the regional or county system to various destinations or points of interest… also serve as feeder connectors within a community into either the County connectors or Regional Corridors." pg 26
Blue Water Trails	Along a river that is "intended to allow small boaters or other water vessels access to rivers, streams, and coastlines." pg 26
Staging Areas	An area located near the non-motorized network that contains efficient parking and restrooms or local points of interest such as libraries, township centers, or parks.

Public forums were hosted to determine each of the corridors and connectors throughout the county. Participants were able to place stickers on county maps that provided that planning department with useful information. Priority votes were given to the most significant and desired county connectors. Once the information received was compiled "special study areas" were established and studied further. A map for each corridor/connector was created and is found on pages 28-30. Each special study area was evaluated to determine feasibility and possible issues.

Design Consideration: Pages 53-65
The purpose of this section is to provide guidelines for local communities in the design and construction of trails and non-motorized pathways. These guidelines were established on the standards from the American Association of State Highway and Transportation Officials (AASHTO) along with state and federal organizations and agencies such as the Federal Highway Administration and National Parks Service. Noted in the document, "These guidelines are not all inclusive. Typical guidelines that are most likely to apply to situations within Macomb County have been highlighted as a reference and starting point for communities and agencies to further their implementation efforts." (pg 54) Below is a list of design and construction guidelines followed by a page number for reference.

Design and Construction Tool	Page Number
Bike Lanes	54-56
• Paved Shoulders	54
• Bike Lane Restriping	55
• Drainage Inlet Grates	55
• Dimensions	56
Systems Separated From Motor Vehicles	57-58
• Shared Use (Peds and Bikes)	57
• Shared Use Within Roads Rights-of-Way	58
Systems Within Riparian Corridors	58-59
Equestrian Systems	59
Blue and Water Trails	59-61
Design and Construction Tool	Page Number
• Water Trail Design and Management Considerations	60-61
Dimensions For Non-Motorized Trails and Paths	60
Other Considerations	61-63
• Materials	61
• Railroad Crossings	61
• Structures	62
• Signage	62
• Maintenance	62
• Routine Trail Tasks	62

• Trail Inspection	62
• Mowing	63
• Tree and Brush Pruning	63
• Leaf and Debris Removal	63
• Snow and Ice Removal	63
• Cleaning and Replacement of Culverts	63
• Maintenance of Water Crossings	63
• Repairs to Signage and Other Amenities	63
Safety Considerations	63
Permits	63
Policies and Contacts (Local, Regional, State, Federal)	64-65

Implementation Strategy: Pages 67-79
The last section of the Macomb County Trailways Master Plan is Implementation Strategy. It is a long-term vision of how local and regional agencies and organizations will coordinate and fund future trail projects. Four sub-categories are included in this sections as follows; Role of the County Department of Planning and Economic Development, Additional Tools and Strategies For Implementation, Phasing Priorities, and Possible Funding Sources.

An additional section includes recommended actions for assisting future implementation efforts for the trail network throughout the region. This includes local communities amending Land Use, Transportation, and Recreation Master Plans to include this document and proposed developments should follow the master plan's recommendations, "raise the level of awareness of the plan both internally with county staff as well as with local units of government, regional, state, and national agencies" (pg 68), establish a signage and wayfinding system that is consistent throughout the region, set aside funds for maintenance as projects are constructed, provide updated maps of the trail network to insure accurate data, notify agencies and organizations about grant programs, and coordinate with the county road commission to ensure goals and plans are met. (pg 68)
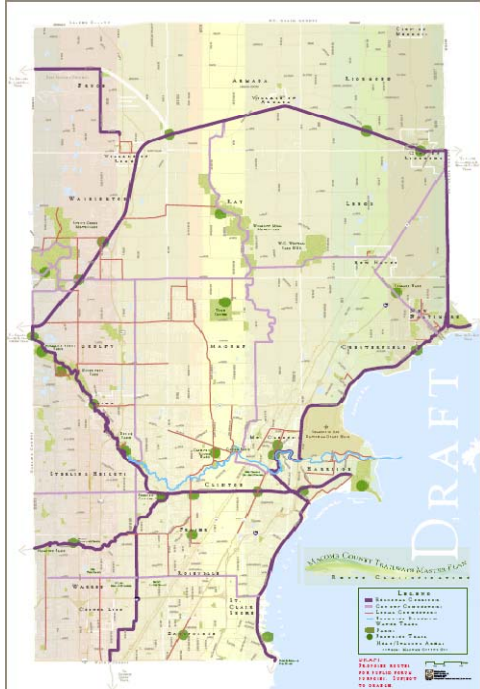
FIGURE 3: FINAL MAP MACOMB COUNTY TRAILWAYS MASTER PLAN
<u>CURRENT PROJECTS:</u>

FIGURE 4: PROPOSED BIKE LANE CONNECTOR,
MACOMB COUNTY, MI

The Detroit Free Press reported a proposed bicycle loop for
Macomb County that will cover the majority of the county along with a connector to surrounding
regions. Most of the funding will be in federal stimulus dollars and cost 8.5 million dollars. The projected
completion date of this 70 mile loop is the end of 2011.
Source: Detroit Free Press

APPENDIX H: MERIDIAN TOWNSHIP HEALTH IMPACT ASSESSMENT

CHARTER TOWNSHIP OF MERIDIAN
HEALTH IMPACT ASSESSMENT

Please provide written responses to each applicable question. For those questions which are not applicable, please indicate so on the form. Attach additional sheets if more space is necessary to respond fully to the questions. Submit completed form with your project/development application.

Project Name:_____, **Address/Location:** _____ **Case #** _____

Type of Project: ☐ **Residential** ☐ **Commercial** ☐ **Office** ☐ **Public**

Water Quality Considerations/Impacts

YES   NO

What is the source of water for the proposed project/development? _____
What is the estimated daily water demand?_____

☐ ☐ **If public water,** is there available capacity to handle this project in the municipal facilities?
☐ ☐ **If private well,** is the water considered potable (safe)?
☐ ☐ Is the project/development within existing municipal service areas?
☐ ☐ Are there nearby sources of potential water contamination? IF YES LIST _____
☐ ☐ Are there underground storage tanks? IF YES LIST _____
☐ ☐ Are their gasoline or oil pipelines? IF YES LIST_____
☐ ☐ Is there a nearby known source of contaminated soil? IF YES LIST _____
☐ ☐ Are there abandoned wells on the site? IF YES LIST _____
☐ ☐ Will the water supply require on-site treatment, such as iron removal?
☐ ☐ Are there any wetlands on the site?
If YES what is/are the size(s) of the wetland(s)? _____
☐ ☐ If wetlands are being impacted, is adequate mitigation being proposed?
☐ ☐ Is the project located in a known floodplain?
☐ ☐ Will the proposed project affect groundwater recharge?
What percentage of the parcel is covered by impervious surfaces? _____
☐ ☐ Does the project affect the overall percentage of impervious surfaces in the watershed?

Wastewater Considerations/Impacts

YES   NO
☐ ☐ Does the project/development require an on-site wastewater system?
☐ ☐ **If YES**, are the soils appropriate to support a septic system?
☐ ☐ Is project/development within the service area of the municipal sewage system?

Air Quality Considerations/Impacts

YES   NO
☐ ☐ Does the project/development entail demolition activities?
☐ ☐ **If YES**, has the site been examined for asbestos and/or lead?
☐ ☐ Are there plans for mitigating dust?
☐ ☐ Will the project/development result in increased stationary air emissions?
☐ ☐ **If YES**, are emissions controlled contaminants? PLEASE LIST _____

☐ ☐ Has the applicant obtained necessary permits?
☐ ☐ Will the project result in increased air emissions from cars?
What is the increase in traffic volume projected for peak hours? _____
☐ ☐ Is the proposed use compatible with adjacent uses?
☐ ☐ Is the site near known areas affected by radon?

Solid & Hazardous Waste Disposal

YES   NO
☐ ☐ Is the proposed project/development located near any facility handling or disposing of hazardous waste?
☐ ☐ Is there historic evidence of solid or hazardous waste disposal or releases on or adjacent to the site?
☐ ☐ Are there plans in place to prevent the release of hazardous materials into the environment in the case of fire?
If YES describe _____
☐ ☐ Does the project entail hazardous waste disposal?
☐ ☐ **If YES** is the proposed waste handling or disposal activity compatible with adjacent use and/or zoning?
☐ ☐ Is the proposed waste handling or disposal activity compatible with the Ingham County Solid Waste Management Plan?
☐ ☐ Is the facility near vulnerable resources (e.g. nursing homes) that may require contingency planning for extra protection in the event of an on-site fire? IF ANY LIST_____

Noise Considerations/Impacts

YES   NO
☐ ☐ Is the project/development likely to generate noises that will create a nuisance to neighboring uses?
If YES please list type of noise(s) and hours_____
☐ ☐ Are there engineered or non-engineered measures that can be employed to mitigate nuisance noises?
If YES please list _____
☐ ☐ Does the generated noise violate the noise ordinance?

Social Capital

YES   NO
☐ ☐ Does the project/development promote interaction between neighbors?
If Yes please list _____
☐ ☐ Is the physical design of the project harmonious with the overall neighborhood?

Physical Activity and Injury Prevention

YES   NO
☐ ☐ Does the project/development provide mobility options for those who cannot drive?
☐ ☐ Does the project/development have sidewalks that lead to local destinations?
If YES what is the proposed width of the sidewalks? _____
☐ ☐ Does the project/development have or connect to a trail system for walking or biking?
☐ ☐ Does the project/development contain elements that enhance the feeling of neighborhood safety?
☐ ☐ Are local streetlights being provided?
☐ ☐ Are houses oriented toward the street to provide "eyes on the street?"
☐ ☐ Can a child walk safely to school?
☐ ☐ Are there sidewalks/pathways along the route to the school(s)?
☐ ☐ What is the walking distance to the area's schools? _____
☐ ☐ Is the visibility at intersections good?/Can drivers see short children?
☐ ☐ Does the route contain known dangerous intersections?
If YES please list _____
☐ ☐ Are there crossing guards at these intersections?
☐ ☐ Will the project/development contain a significant elderly population?
☐ ☐ Can the elderly walk to important destinations (i.e. banks, post office, and library)?

What is the walking distance to these destinations? _____

☐ ☐ Are there sidewalks/pathways along the routes to these destinations?

☐ ☐ Does the route contain known dangerous intersections?

☐ ☐ Does the project contain design elements to calm traffic such as speed humps, extended corners, raised street crossings, or similar features? IF ANY LIST _____

☐ ☐ Does the project/development present unsafe conditions or deter access and free mobility for the physically handicapped?

☐ ☐ For projects/development on arterial streets does the plan include pedestrian crossing signals and/or mid-street islands?

☐ ☐ Is public transportation available?

If YES where and how close is the nearest bus stop? _____

☐ ☐ Does the nearest bus stop have a shelter?

☐ ☐ Does the nearest the bus stop have a bench?

Health Equity/Food Systems (HOUSING PROJECTS ONLY)

YES   NO

☐ ☐ Does the project provide for a diversity of housing types to accommodate a variety of income groups?

What is the square footage of the smallest dwelling unit? _____

What is the estimated market price? _____

☐ ☐ Does this price represent an "affordable house" given the area median income?

☐ ☐ Is the proposed project/development located in an area that provides easy access to healthy foods?

What is the distance to the nearest full service grocery store?_____

What is the distance to the nearest convenience store?_____

☐ ☐ Does the neighborhood have a disproportionate number of liquor/party stores?

☐ ☐ Is the project/development located in a neighborhood or region characterized by concentrated poverty?

☐ ☐ Are affected residents involved in the planning process?

☐ ☐ Are disadvantaged populations at greater risk of exposure to environmental hazards?

Growth Objectives/Regional Growth Project

YES   NO

☐ ☐ Is the project located within the designated growth area of the Tri-County Regional Growth Project?

APPENDIX I: FUNDING SOURCES FOR GREEN BUILDINGS

Background:

There are only two programs known that provide funding specifically for 'green building'. These include the Kresge foundation's **Green Building challenge** for non-profit efforts and the **Green Communities Funding**. The Green Communities began as a five-year, $550 million fund to build more than 8,500 homes across the country that provide significant health, economic and environmental benefits to low-income families and communities.

Typically 'green building' is too broad an issue to have funding targeted to this effort. To locate funding, it is best to consider each of the design benefits and features. Green buildings have the potential for multiple benefits on the building, the occupants and the environment.

Potential benefits include:

➢ Community (Re)Development
The site selection and design may impact former brownfields, incorporate green spaces, trails, or other aspects that connect to the community design or redevelopment.

➢ Education
Any of the features of a green building may be used for education or demonstration to the public.

➢ Energy Efficiency - Urban Heat
Green and reflective roofs, plantings in the parking lot and other tips cool the surrounding urban area as well as the building. This translates into energy efficiency and building comfort.

➢ Recreation – Transportation - Health
Encouraging biking, or installing green trails and roofs and using less toxics can provide a reduction in transportation emissions, a healthier staff or public, pleasant views and relaxed atmosphere.

➢ Stormwater reduction
Green roofs, permeable pavers, bioswales, rain gardens, using rain water for toilets, cisterns for irrigation, all reduce stormwater. Stormwater reduction means a reduction in the:
   o quantity in the municipal stormwater sewers and infrastructure; and
   o quantity fluctuations in rivers and streams (scouring impacts on fisheries, area flooding and recreation impacts).
   o

These are just some of the benefits and impacts that green buildings have. With the specifics of your project in mind, consider whether the following grants and loans are applicable.

▰Funding Sources▰

❖ **Brownfield Redevelopment Tax Credits**

Effective April 8, 2008, Act 89, PA 2008 amended the Brownfield Redevelopment tax credits. Among other changes, the revisions included an increase in the credits available and added "sustainable development" as one of several criteria.

❖ **DEQ Financial Assistance, Grants, and Loans**

This web site contains a link for the catalogue of information on the grants and loans administered by the Department of Environmental Quality. This can be searched for the type of grant or loan. For example:

- **Brownfield grants**
- **Small Business P2 Loans**
  The Small Business Pollution Prevention (P2) Loan Program provides loans of up to $400,000 at an interest rate of 5% or less to businesses with fewer than 500 employees. This loan program may be used for some aspects of green building but the project must be able to measure an environmental improvement or pollution prevention achieved.
- **Stormwater related - Non-point source grants** – for municipalities and non-profits for projects such as that listed under stormwater reduction above.
- Other DEQ grants may be applicable – check the complete resource linked above.

❖ **DNR - Department of Natural Resources Grants**

Fisheries funding may be applicable if there is a significant reduction in the stormwater impact on the rivers and streams. Recreation funding may be applicable if the project connects with or involves a community trail or system. Check the DNR grants if these topics are applicable.

❖ **Energy Funding Sources**

- **Energy Office funding announcements**   Funding FAQ

The Michigan Energy Office has some funding suggestions for energy efficiency projects.

The Community Energy Project Grants provide funding to non-profit and public organizations for: 1) Solar and/or wind energy education, 2) Bioenergy/biofuels/bioproducts education, 3) Green commuting projects, 4) Green building projects... In 2006, funding per was a maximum of $6,000. This is closed for 2007. Look for these annually in July-August.

The Energy Efficiency and Renewable Energy Outreach Grants provide funding to non-profit or public organizations for outreach projects to promote and market 1) Solar Energy, 2) Wind Energy, … and 4) ENERGY STAR Homes. In 2006, funding per project was a maximum of $50,000. This is closed for 2007. Look for these annually in July-August.

- **Energy Tax Incentives.org**

This web site provides some basic information on the energy code and the tax incentives.

- **Financing Energy Efficiency** -Rebuild America (community wide info)

This is a 86 page Department of Energy document that discusses different financing options, including performance contracts.

❖ EPA Green Building Re$ources

This is a 30 page list of potential funding sources compiled by EPA in October, 2000. Only the relevant Michigan resources are listed. Although dated, it may provide ideas of where to locate funding.

❖ Fisheries See DNR above

❖ Historic Buildings

Historic buildings are tangible links with the past. They help give a community a sense of identity, stability and orientation. The federal and state governments encourage the preservation of historic buildings through various programs including federal and state income tax incentives and grant programs to support the rehabilitation of historic and older buildings. The State Historic Preservation Office (SHPO), Michigan Historical Center, Michigan Department of History, Arts and Libraries administers these financial incentive programs. Information on these programs can be found on the SHPO website at www.michigan.gov/hpcredit

❖ Stormwater Funding

MDEQ presently manages 3 stormwater funding programs under non-point source. All three are announced on about an annual basis. The funding round for 2007 should be announced in October or November on the website

❖ Trails and other Green Infrastructure (Health)

- **Active & Healthy Living**

   Green building may support an increase in access to healthy choices, healthy eating and physical activity. Will the project --Help employees stay active (provide a walking trail)? Provide an herbal garden? Expand a community recreation trail? Improve walking trails to community grocers or farm markets? To determine if funding is available in your area, contact your local county health department.

- **DNR Natural Resources Trust Fund**

The objective is for the acquisition and development of lands and facilities for outdoor recreation or the protection of Michigan's significant natural resources. The DNR also has a grant for trees planted in public areas. Arbor Day Mini-grants

- **Energy Office**, Department of Labor and Economic Growth
The Energy Office has Community Energy Project Grants up to $6,000 for public or non-profit organizations that includes a Green Commuting category. This has funded a community biking program. Grant solicitation is in the summer for projects developed during the following year.

- **Greenways Initiative**
Community Foundation of Southeast Michigan – This region specific funding helps "connect the communities of southeastern Michigan through the creation of a connected green infrastructure, including biking and hiking paths…"

- **National Center for Biking** - Ped & Bike Info Center
The National Center for Biking and the Ped and Bike info center has additional resources such as a great image library for pedestrian designs.

- **Robert Wood Johnson Foundation**
Robert Wood Johnson Foundation provides funding on health related issues. Their website "Active Living By Design" www.activelivingbydesign.org   and community walkability may be of interest. Michigan's resources (no grants) on the issue are at: www.mihealthtools.org

- **Safe Routes to School (SR2S) Program**
This is a movement to make it safe, convenient and fun for children to bicycle and walk to school. Safe Routes to School initiatives also help ease traffic jams and air pollution, unite neighborhoods and contribute to students' health and readiness to learn in school. Contact the Governor's Council on Physical Fitness at (517) 347-7891.

- **Transportation Enhancement Activities (TEA)**   **Department of Transportation**
"Provision of facilities for pedestrians and bicycles, pedestrian and bicycle safety education activities," and the "conversion of abandoned railway corridors to trails," are eligible funding activities. Anyone can sponsor a project, but they must apply through an eligible applicant. Eligible applicants include city and village road agencies, all county road commissions, public transit agencies, the Michigan Department of Transportation, and the Michigan Department of Natural Resources for qualifying rail/trail projects.

Applications are accepted year-round. The average match has been more than 30%. Contact: Amber Thelen (517) 241-1456, ThelenA@michigan.gov

- **Other**
This is the Safe Routes to School web site but if you scroll down, it lists other trail funding sources.

Updated 07/15/08
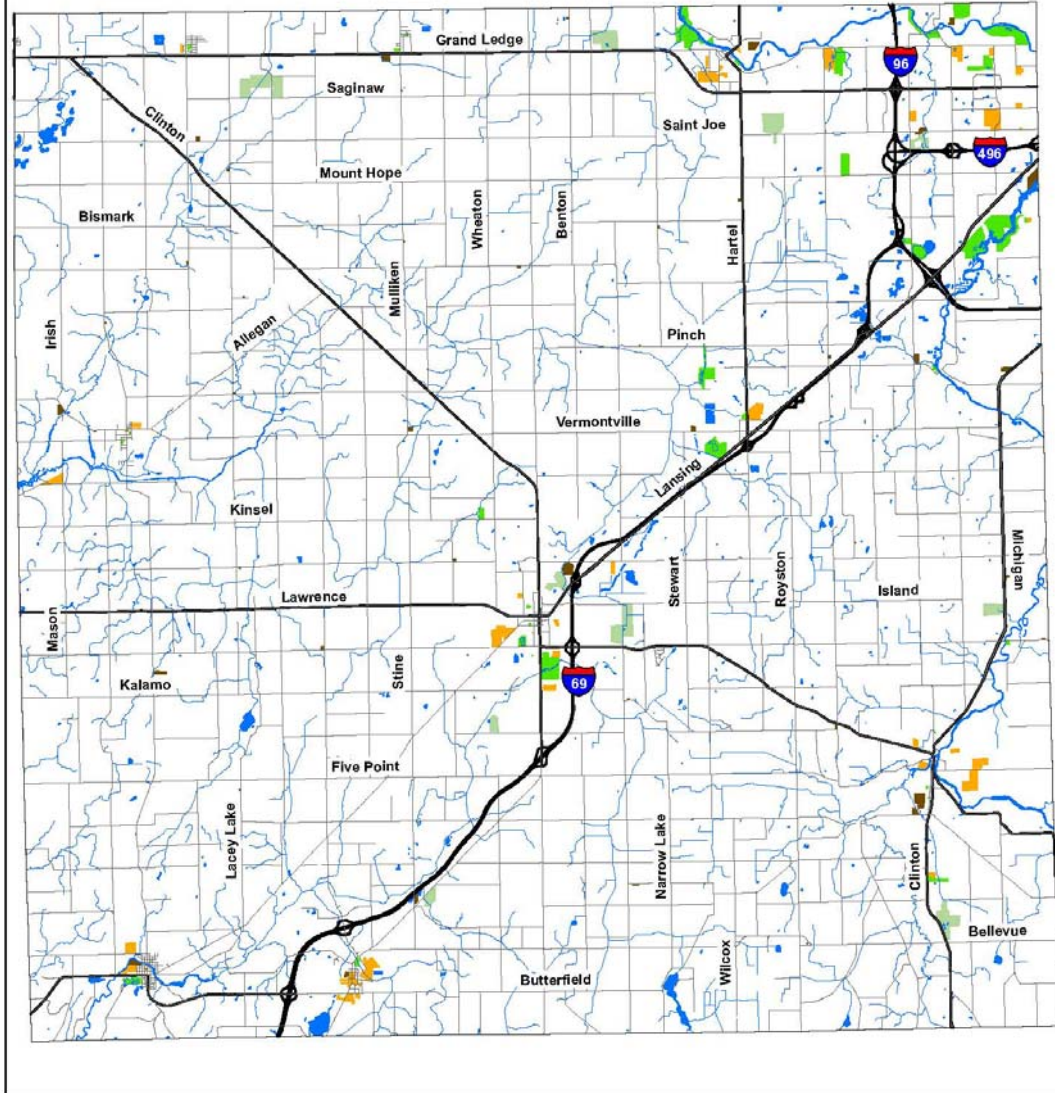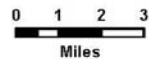
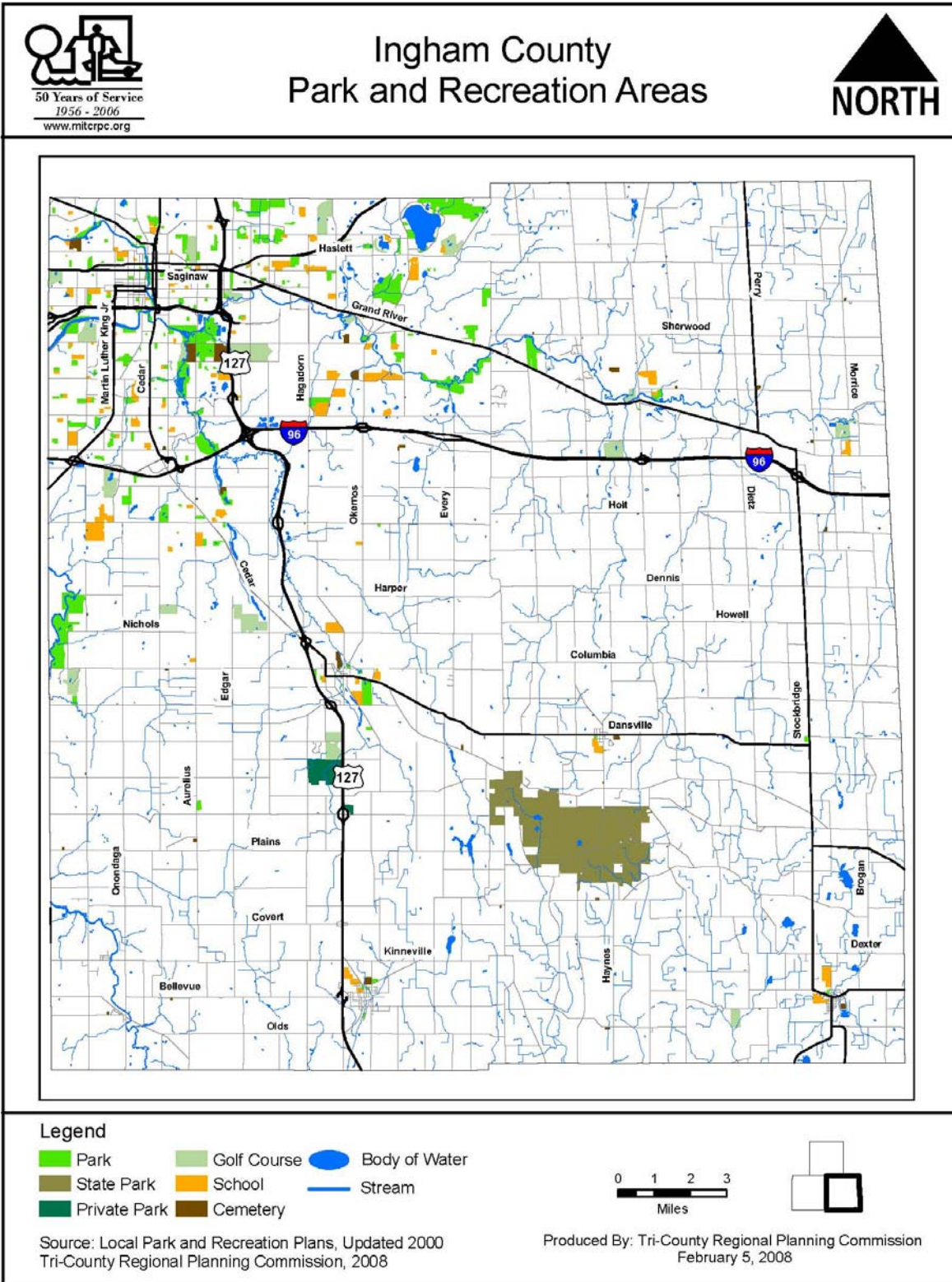# APPENDIX J: TRI-COUNTY PARKS

Eaton County
Park and Recreation Areas

Ingham County
Park and Recreation Areas

NORTH
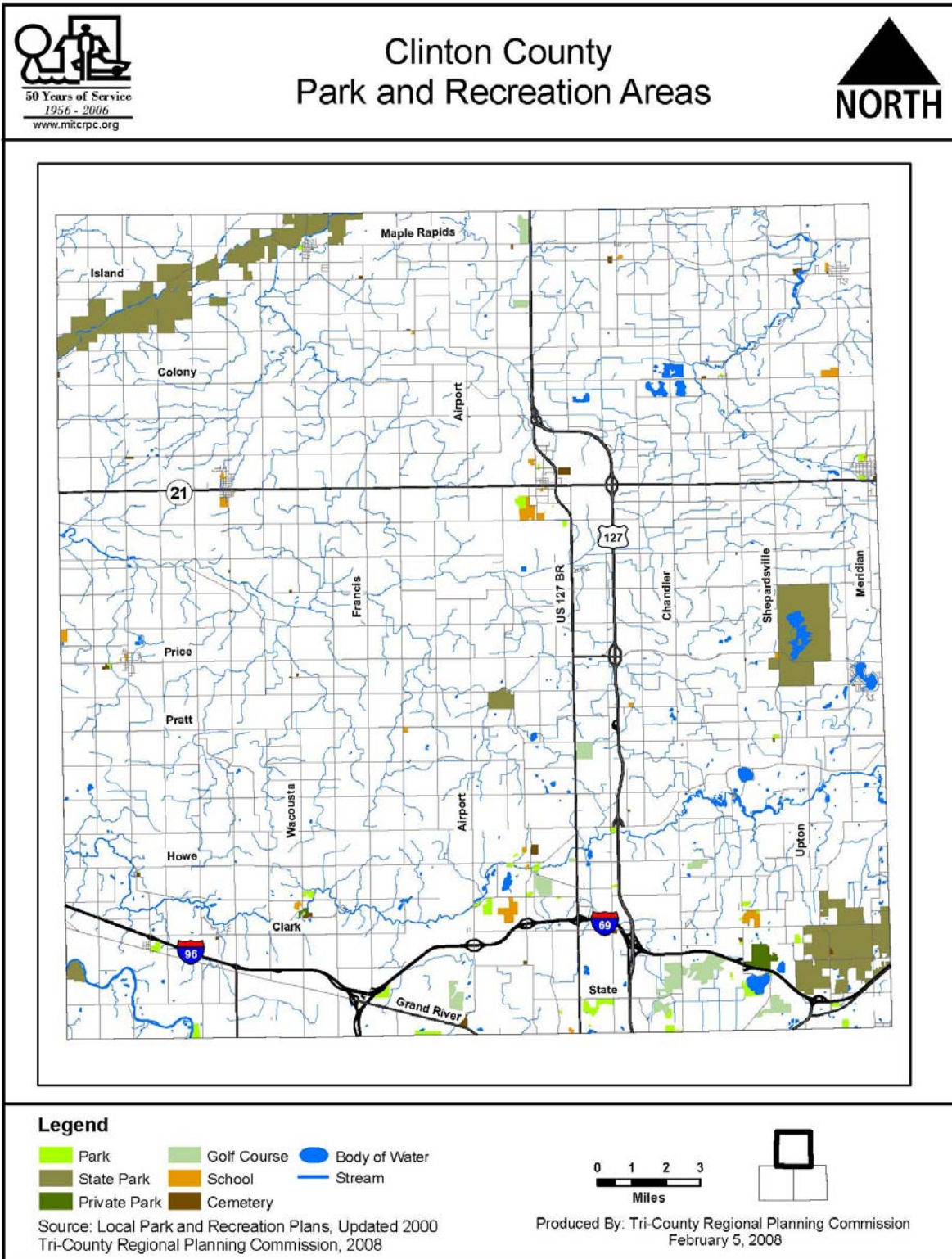
Legend

Park	Golf Course	Body of Water
State Park	School	Stream
Private Park	Cemetery	

Source: Local Park and Recreation Plans, Updated 2000
Tri-County Regional Planning Commission, 2008

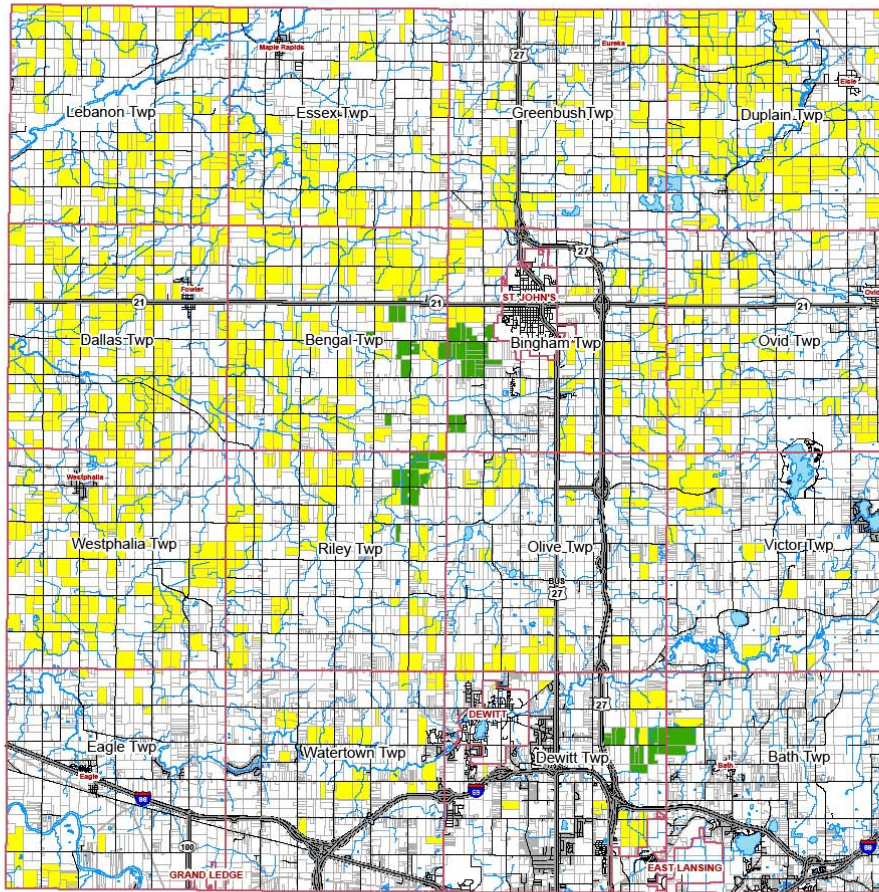Produced By: Tri-County Regional Planning Commission
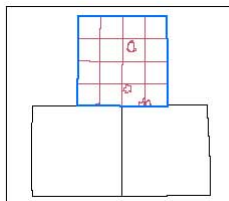February 5, 2008

0   1   2   3
Miles

APPENDIX K: PDR & TDR TRI-COUNTY MAPS

**50 Years of Service
1956 - 2006**

Clinton County Public Act 451 and Purchase of Development Rights

NORTH

0   8   16
                         Miles

Active (1190)

Purchased Development Rights (55)

Clinton Townships

Source: Michigan Department of Agriculture, 2007
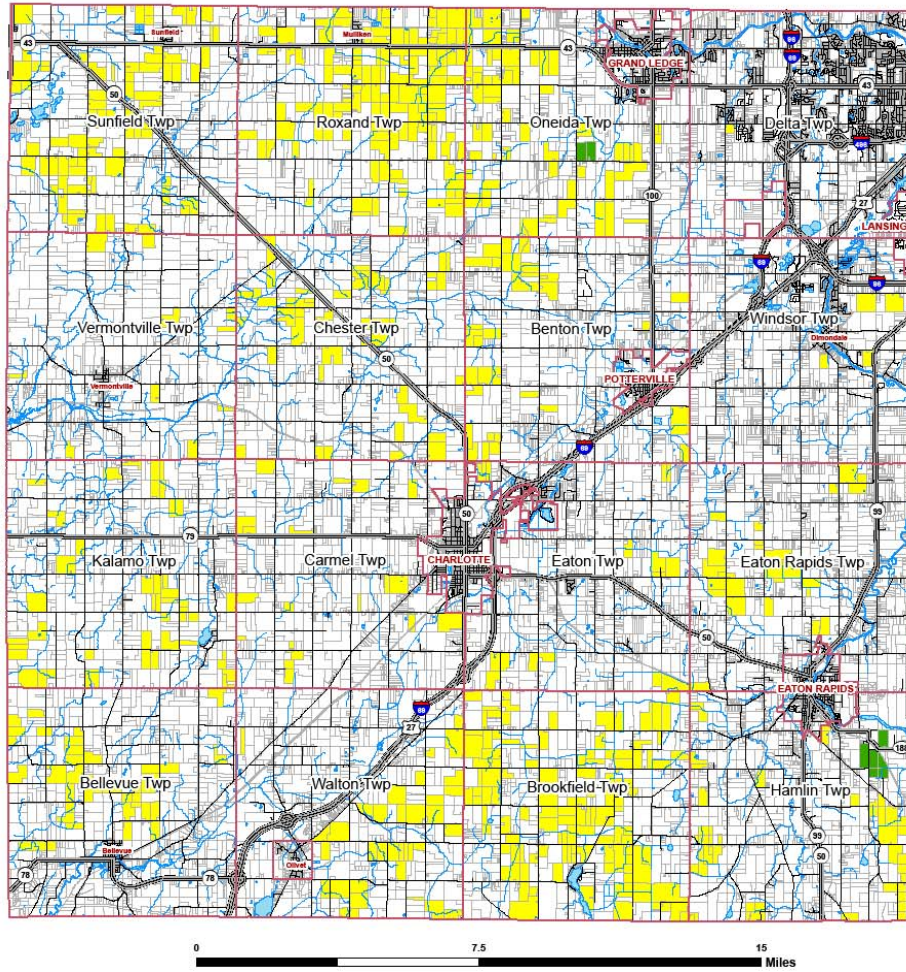Tri-County Regional Planning Commission, 2007

Produced By: Tri-County Regional Planning Commission
October 2, 2008

This map was created for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.
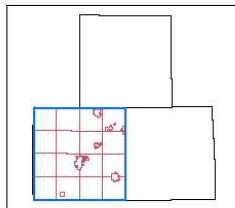
50 Years of Service
1956 - 2006

Eaton County Public Act 451 and Purchase of Development Rights

NORTH

0   7.5   15
Miles

Active (704)

Purchased Development Rights (8)

Eaton Townships

Source: Michigan Department of Agriculture, 2007
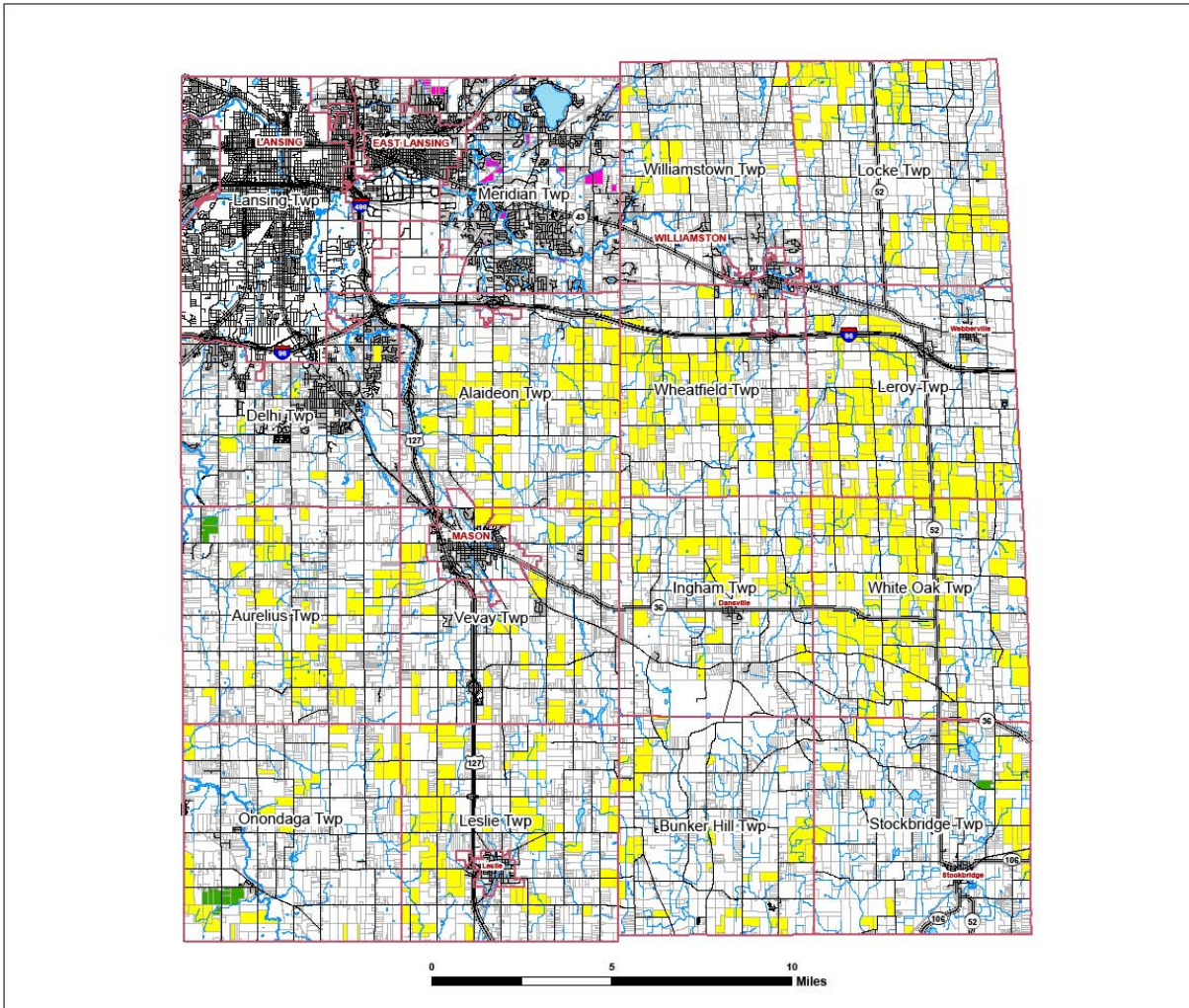Tri-County Regional Planning Commission, 2007

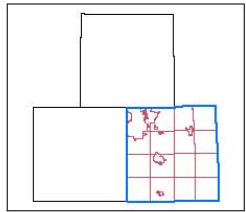Produced By: Tri-County Regional Planning Commission
October 2, 2008

This map was created for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.

Ingham County Public Act 451 and Purchase of Development Rights

50 Years of Service
1956 - 2006

NORTH

Ingham Townships

Open Space Preservation (23)

Purchased Development Rights (12)

Active (829)

Source: Michigan Department of Agriculture, 2007
Tri-County Regional Planning Commission, 2007
Meridian Charter Township Department of Community Planning & Development, 10/6/08

Produced By: Tri-County Regional Planning Commission
October 2, 2008

This map was created for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.